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Consumers' Preferences for Fresh Meat Attributes and Retail Outlets in China: the Case of Hangzhou and Shanghai

By

Xiaoping Miao

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements of the degree of Master of Science

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Abstract

This thesis aims at gaining a better understanding of the Chinese consumers' perceptions for fresh meat attributes and retail outlets. It is found that food safety is the most important fresh meat attribute and the wet markets are the most popular retail outlet. The supermarkets have become the second, surpassing other retail outlets, such as wholesalers, meat shop and butchers. The results from ordinary least square regression analyses reveal that respondents' socio-economic and demographic characteristics are important factors affecting respondents' perceptions of attributes of fresh meat. Conditional logit model analyses suggest that both attributes of retail outlets and respondents' characteristics influenced respondents' choices of retail outlets. A number of marketing implications based on these results are drawn for those who are interested in marketing meat to China.

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Dedication

Dedicated to my parents, Meijuan Chen and Limin Miao

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Chapter 1. Introduction

1.1 Background

Following the economic reforms that took place in China at the end of the 1970s, China's national economy initially grew at more than 10 per cent per year, but has recently slowed down to between 7 and 8 per cent since 1998. Rapid economic growth has been encouraging the increased contribution of livestock products to human diets in China. After experiencing years of shortages of meat during the 1960's, 1970's and early 1980's, Chinese meat consumers have finally enjoyed abundant meat supplies. Total meat[1] production in China rapidly increased from 12 million tons in 1980 to 60.3 million tons in 2000 (USDA 2000). Per capita annual meat consumption in China rose rapidly from 13 kg to 47 kg from 1980 to 1996 and has stabilized at around 48kg since then (USDA, 2000). The Chinese are also becoming diverse in their tastes and preferences towards food products. Some anecdotal evidence suggests that Chinese consumers, with their increased affluence, like their western counterparts, are increasingly demanding leaner, safer, and more convenient meat products (Li and Nicholas 1997; Yangtze Evening Post 2000; Xinhua News Agency 2000). The western-style supermarket has also emerged as a new shopping place for the Chinese consumers to purchase food, providing an alternative to the traditional state-run department stores and wet markets[2].

These new developments have made the Chinese meat market very dynamic and increasingly competitive. With China's recent entry to the World Trade Organization (WTO) in 2001, many researchers have forecasted increased market access for

[1] Meat refers to pork, beef and veal, poultry, and mutton, fish and other meat.
[2] Wet/free market: a food market where private sellers or farmers sell food. Usually the places are in an open area, specializing in fresh produce.

agricultural food exports to China. Major meat exporting countries such as United States, Australia, Canada, and New Zealand have seen great long term opportunities in the Chinese meat market. To be successful in the Chinese market, it is important to understand the attitudes and preferences of Chinese consumers towards meat attributes and meat outlets. Such knowledge should enable meat exporters or suppliers to develop more effective marketing strategies in order to penetrate China's thriving meat market.

1.2 Objectives

The purpose of this research is to gain a better understanding of the Chinese consumers' preferences for the attributes of fresh meat and retail outlets. The specific objectives are:

To identify how the Chinese consumers rank a variety of selected attributes of fresh meat and evaluate the effects of the socio-economic and demographic characteristics on their preferences for the selected meat attributes;

To identify where the Chinese consumers purchase most of their fresh meat and examine how various attributes of retail outlets and respondents' socio-economic and demographic characteristics influence their choices of retail outlets;

To develop marketing implications for those who are interested in marketing fresh meat in China.

1.3 The Data

Shanghai and Hangzhou were the target cities for the survey because the two cities are among the richest cities and most trend-setting in China. A better understanding

of consumers' preferences towards meat attributes and retail outlets in Hangzhou and Shanghai can help meat marketers to develop better strategies to target the markets and provide a forecast for the rest of China in the future. The survey instrument was designed in consultation with meat retailers and wholesalers in Hangzhou and Shanghai. A pre-testing of the questionnaire was also done before the field interviews to ensure that important meat attributes and attributes of retail outlets were captured in the questionnaire. In each city, a team of two enumerators from Zhejiang University conducted the survey. They were trained before embarking on the survey. A total of 427 meat consumers completed the interview-based survey in March and April, 2000. A mall intercept survey method was adopted to solicit the following information: respondents' perception of selected meat attributes, where respondents purchased most of their fresh meat, attributes of retail outlets that may influence their choices of retail outlets, and respondents' socio-economic and demographic backgrounds.

1.4 Methods of Analysis

A self-explication approach was used to understand respondents' perceptions of various attributes of fresh meat. Descriptive statistics were used to describe the respondents' perceptions of meat attributes and their choices of retail outlets. To determine whether or not consumers actually make distinctions on the selected fresh meat attributes, non-parametric Kruskal-Wallis tests were applied. Since not all the eighteen meat attributes were valued distinctively by consumers, factor analysis was used to re-group the eighteen attributes into smaller categories of the attributes. A ordinary least square regression analysis was adopted to investigate the effect of respondents' socio-economic and demographic characteristics on their perceptions of attributes of fresh

meat. Subsequently, conditional logit models were applied to examine how various store attributes and respondents' socio-economic and demographic variables influenced their choices of retail outlets.

1.5 Organization of the Thesis

The rest of the thesis is organized as follows. Chapter 2 provides a description of meat production, demand and trade in China. It also notes the consumers' concerns on food safety and quality and describes the meat retailing system in China. A brief literature on perceptions of food attributes and store choices are reviewed in Chapter 3. Chapter 4 outlines conceptual and empirical frameworks for the analysis and discusses the survey design and data collection methods. Descriptive statistics for consumers' perceptions of meat attributes and retail outlets are provided in Chapter 5. Ordinary least square (OLS) regression analysis is applied to examine consumers' perceptions of attributes of fresh meat, and estimation results are discussed in Chapter 6. Chapter 7 investigates the determinants of respondents' choices of retail outlets and the estimation results of conditional logit model are explained. In the final chapter, conclusions and marketing implications of the study results are summarized and future research directions are suggested.

Chapter 2. The Changing Meat Market in China

2.1 Introduction

This chapter describes meat production, demand, and trade in China. The changing household food consumption patterns are observed and discussed. The emerging food safety and quality concerns are discussed along with changing the meat retailing system in China.

2.2 Meat Supply, Demand, and Trade in Chinese Market

It is commonly recognized that Chinese meat production has been over-estimated (Fuller et al. 2001a, Fuller et al. 2001b). As seen from the revised production data of the year 1996 from USDA, production data was revised down 27.9 percent for pork, 39.02 percent for beef, 32.6 percent for mutton, and 8.55 percent for poultry from initial forecasts provided by China's State Statistical Bureau (SSB). However it is unclear whether such simple treatment of data inconsistencies would provide a better picture of China's meat market. Nevertheless, it is the best data available to us. The following description of meat consumption and production is based on revised data from USDA which is published in 1998.

2.2.1 Meat Production in China

China is a major world producer of animal proteins. According to the United States Department of Agriculture (USDA 2001), China is the world's largest producer of pork, mutton, fish and eggs. It ranks second and third in poultry and beef production respectively. The structure of animal husbandry in China involves three major forms, including part-time household operations, called "backyard feeding;" full time household

operations, called "specialised households;" and large-scale commercial operations, a mix of state farms, joint ventures with foreign firms, and private Chinese companies. About 80 percent of China's pork production comes from backyard rural producers. Hogs are normally fed with household and farm wastes, a diet that lacks certain essential amino acids. As a result, hog growth rates are low and their exterior fat is high (Qin and Amponsah 2000).

In this study, meats include pork, beef and veal, poultry, mutton, goat, fish and other meats. Meat production is broken down into four aspects: pork production, beef and veal production, poultry production, and mutton and goat production. Table 2-1 gives total production, import and export, total consumption, and per capita consumption of major meats in mainland China for the selected years. Total meat production climbed from 13,306 thousand metric tons in 1980 to 19,199 thousand metric tons in 1985 and rose steadily thereafter to 58,482 thousand metric tons in 1998. Between the period 1980 to 1996, meat production increased almost fourfold. In particular, beef, mutton and poultry showed much a stronger growth rate than that of pork. The rapid growth in beef, mutton, and poultry production has escalated over the last few years. In just eight years from 1990 to 1998, their production increased by almost 282%, 119%, and 287%, respectively. The share of pork has declined from 85% in 1980 to 66% in 1998.

Pork Production

Total pork production in China increased from 11,341 thousand metric tons in 1980 to 38837 thousand metric tons in 1998. Between the period 1980 and 1998, pork output increased steadily by a factor of almost 4 times. The only exception was 1996, when a data adjustment of 27.9 downward was implemented by the SSB. The increased

pork output resulted from the implementation of rural reforms. The policies included increasing procurement prices, deregulating the livestock markets, enhancing the feed industry, providing better breeds and feeder pigs, and setting up a network of technical and veterinary services (USDA ERS 2001).

Beef and Beef Production

Total beef and veal production in China increased from 295 thousand metric tons in 1980 to 4,799 thousand metric tons in 1998. Between the period 1980 and 1998, beef production increased dramatically, by almost 16 times. China's beef output rose more than 90 percent a year. Even acknowledging the fact that China's beef output may have been over-reported by 20 to 30 percent in the mid-1990s, the annual growth rate of output would still be more than 10 percent (USDA 1998). Many factors have contributed to this rapid increase, including high beef prices, improved breeding, specialized cattle-raising units, de-centralized marketing channels, and favorable development policies.

Poultry Production

China's statisticians define poultry as including chickens, ducks, geese, and other birds such as quail, pigeons, doves, emu, and ostriches. China's poultry production has increased rapidly during the past two decades. Total poultry production in China is also increasing dramatically, from 1,225 thousand metric tons in 1980 to 12,500 thousand metric tons in 1998. Between the period 1980 and 1998, poultry production increased by a factor of almost 10 times.

Mutton and Goat Production

Mutton has been a traditional delicacy in Chinese cuisine. Consumption peaks in the winter season when family members get together for special "hot-pot" meals. Mutton

also shows up in various gourmet menus and is popular in major restaurants (USDA 1998). Mutton production increased from 445 thousand metric tons in 1980 to 2346 thousand metric tons in 1998. Mutton production has increased by almost 5 times.

2.2.2 Meat Demand in China

With respect to the animal protein consumption, pork accounts for half of all the animal protein consumed by China's residents. Poultry and eggs make up 26.5 percent of consumers' animal protein intake. Protein from fish accounts for 15.8 percent of consumption. Beef, mutton, and milk account for the remaining portion (USDA 1998). Pork is the most important type of meat consumed in China, accounting for more than 70 per cent of total meat consumption. Poultry is the second most important type of meat consumed in China, accounting for approximately 20 per cent of total meat consumption. Beef is the least consumed meat, accounting for approximately 10 percent of all meat consumption.

Per capita animal protein intake in China remains much lower than its neighbour's; for example, citizens of South Korea eat 5 times as much animal protein per capita as those of China, Japan 7 times, and Taiwan 9 times. Per capita animal intake in the U. S. is 11 times greater (Crook and Colby 1998). Figure 2-1 shows China's per capita meat consumption, including poultry, beef and veal, pork and broilers, compared with that of Hong Kong, Taiwan, the United States and Canada in 1999. The major trend is that China's consumption of the four types of meat is much lower than that of other countries. Specifically, per capita beef and veal consumption is much lower than that in other countries; for example, it is 2 times lower than that of Hong Kong, 10 times lower than that of the U. S., and 8 times lower than that of Canada. Per capita consumption of

poultry and broilers is also much lower than that in other countries. Only per capita pork consumption is equivalent to that in the U. S. and Canada, while it is lower than that in Hong Kong and Taiwan.

2.2.3 Livestock Product Trade in China

Several studies predicted that China would increase its imports of livestock products in the future (Fuller et al. 2002, Wang et al. 1998, Sun 2001, Wailes et al. 1998, Fuller 1997, Fuller and Hayes 1998) with its increasingly liberated trade regime. Wang et al. (1998) suggested that China's demand for animal products would continue to grow as income increases, and a reduction on China's import tariffs would significantly increase its net pork and poultry imports. Similarly, Fuller and Hayes (1998) argued that Chinese policy-makers would strongly oppose any significant food imports. However, the high food prices that were associated with current policies, coupled with demands imposed by international trade liberalization agreements, will eventually lead to a more liberal trade regime. When liberalization occurs, China will import large quantities of feed-grains. Eventually, meat product imports will grow. In the same way, Fuller (1997) argued that unless agricultural productivity continues to increase at a sufficient pace, China's imports of grains and/or meats will grow. Again, Wailes et al. (1998) pointed that trade reform, coupled with China's fundamental characteristics – the size and growth of its population, the high rate of income growth, and the rise of an urban middle class – makes China one of the biggest potential markets for U. S. value enhanced agricultural trade in the future.

There are a number of possible reasons of the potential increase in the China's meat imports. Firstly, the presence of a considerable price gap between domestic and international meat prices causes increased imports of foreign meat products into China. In

connection with this, the fact that secondary meat products (such as legs, wings, and livers) that Westerners do not eat, are extremely popular in China makes the price gap even more outstanding (Sun 2001, Fuller and Hayes 1998). For example, the pork import market is exclusively made up of offal (Market Research Centre 2002). The second possible reason may be the lag in domestic livestock product production behind domestic meat demand and consumption. Finally, China's WTO accession may increase the openness of China's agricultural trade and allow more imports (Gale 2002). Previously, China blocked livestock imports through a system of high tariffs, restrictive import licensing and distribution practices, and complicated and arbitrary sanitary requirements. New tariff rates after its WTO accession for meat products will be phased in by 2004, reducing them from 20-45% to 10-20% (Market Research Centre 2002).

Despite the fact that China imports and exports meats, the amount is small relative to total production. In other words, China is an insignificant player in international livestock product trade. For example, the annual net export value is in the range of $700 to $800 million U.S (Ke 2001). China exported only about 3 percent of its poultry meat output and 1% of its beef output in 1998. Mutton exports as a share of total output are 0.3%, and pork exports only 0.2%. Consequently, domestic meat production is roughly equal to meat consumption, implying that China is self-sufficient in meats. Nevertheless, the flows of Chinese meat imports continue to grow. As suggested by Table 2-1, meat imports into China over the past 18 years have increased rapidly, from 68 thousand metric ton in 1990 to 863 thousand metric tons in 1998. The most substantial change is the relatively rapid increase in poultry imports. China's poultry imports have increased from 68 thousand metric tons in 1990 to 850 thousand metric tons in 1998. This

growth in imports has resulted in China's becoming a net importer of poultry. In 1998, China was a net exporter of beef, mutton, and pork, exporting approximately 50, 8, 90 thousand metric tons respectively. However, it is widely believed that China's official trade figures do not accurately reflect the true amount of meat that is imported into China. It has been suggested that a significant volume of meat is smuggled into China, though the extent of meat smuggling is unknown.

It is also important to understand the current major players in China's import markets. Hong Kong is the most important import market. On average, Hong Kong supplied 56% of imported beef to China, 32% of imported pork, 85% of imported poultry, 72% of offal, and 56% of processed meats. In addition to Hong Kong, Australia and the United States are important beef suppliers; Australia, Canada and 'other countries' are important pork suppliers; Australia and New Zealand are important mutton suppliers, the United States is the predominant poultry supplier; Australia and the United States are important offal suppliers; and Australia, the United States and 'other countries' are important processed meat suppliers (USDA 2000). China's export markets are quite localized, with most shipments going to China's closest neighbors – Hong Kong, Japan, and Russia (USDA 2000).

2.3 Changing Household Food Consumption Patterns

China has long been regarded as rice-consuming country. In the 1950s and 1960s, before the open door policy and a series of economic and social reform, the food consumption was mainly composed of rice, wheat and tubers, which accounted for 38 per cent of total food expenditures, with only 9.1 kg meat for a whole year. Since 1978, China's progressive economic reform towards a market-oriented economy, increased

disposable income, and mass urbanization have had profound effects on its food consumption patterns. Chinese consumers are shifting from rice-based meals toward meat, fish, processed foods and high-protein diets. Today, Chinese consumers have much more abundant and diverse diets. In the year 2000, the Chinese people consumed about five times as much pork as in the 1950's; four times as much beef and veal, and eight times as much poultry as in the 1950's. Moreover, they ate about five times as many eggs as in the mid-1960s. The supply of fish has more than quadrupled from 4.4 kg to 18.3 kg per person per year (State Statistics Bureau of China 2001). The tastes of Chinese consumers are also changing. Some studies pointed out Chinese consumers pay more attention to food quality and demand safer and more convenient food (Gale 2002, Wang et al. 1998, Wang et al. 1993).

Several papers on food demand analysis indicate that Chinese consumers increase their purchases of all major food items as their income grows while prices hold constant, specifically demanding more meat products (Hsu et al. 1999). Table 2-2 presents the income and price elasticities estimated by Chern et al. (2000). China's urban residents increase their purchases of fish, poultry, and pork at rates faster than their growth in income. Rural residents also increase their purchases of all items as their incomes rise, but the increase is proportionally less than the increase in income. For rural households, the largest increase occurs for fish, poultry, pork, beef, mutton, and fruit. Both urban and rural Chinese are price sensitive; urban Chinese are fairly price sensitive to items such as poultry, pork, eggs, fish and fruit; while rural Chinese are price sensitive to eggs, pork, poultry, vegetable oil, and fruit.

Rapid income growth has significantly affected the food consumption structure in China. Figure 2-2a and 2-2b depict food expenditure distribution both in 1964 and 1990 respectively, in China. Though food expenditures still accounted for more than 46.41 per cent of the total per capita expenditures in 1990, the structure of food consumption has significantly changed. The proportion of expenditures on grain has decreased dramatically, decreasing from 38 per cent to 12 per cent, and was the third biggest share in 1990 rather than the second biggest as in 1964. The share of non-staple food increased from 47 per cent to 61 per cent, and currently it is still the biggest share of food expenditures. Tea, alcohol and tobacco and other food products increased from 9 per cent to 16 per cent, from 6 per cent to 11 per cent respectively.

If China continues its open-door policy and further liberalizes its economic regime, China's food consumption patterns will change further and become similar to those of other developed Asian countries (Chan 1999). However, there are deep ethnic and cultural differences between countries that must also be taken into account. If China's average diet approaches the current pattern in Hong Kong, Singapore, or South Korea, it will become a huge growing market for both domestic and international food marketers.

2.4 Emerging Food Safety Issues and Quality Concerns

Food safety concerns are a priority and are at the forefront of much of the work in the food and agribusiness industry in countries such as Canada, the U.S. and Europe. Food safety involves a wide array of issues including microbiological food borne pathogens, chemical toxins, labeling, bio-terrorism, and new product development. Such

food safety issues include the genetically modified (GM) products and *e-coli* problems in the meat packing industry (Wilson and Featherstone 2002).

The fundamental rationale behind public food safety regulation is the belief that socially desirable levels of safety in foods are not adequately ensured by the ordinary functioning of the market (Sporleder and Kramer 1983). This could be due to the fact that the market for food safety is imperfect, resulting from information asymmetry. The most significant imperfections are that sellers may be better informed about food safety attributes than consumers. Consumers may have misperceptions concerning the risks and hazards of consuming particular food. Food safety may involve characteristics related to public goods. In this case, food safety information may be over- or undersupplied, and government may intervene and correct imperfections or mitigate their effects (Casewell and Mojduszda 1996).

Little research has been done on consumers' perceptions of food safety attributes for meat products in China. However, there have been many reports about food-born diseases or food poisoning in the mass media. In general, food safety regulations in China are still new and basic, remaining at some initial stage of development. China's food safety standards remain much more basic than those of industrialized countries, which frequently specify standard for a specific pesticide residue for a product.

Public concerns about food safety related to food-poisoning, GM food, conventional food and other issues have increased during the last decade in China. Food poisoning is related to the illegal use of certain chemicals or drugs. Possible reasons include misuse of drugs and industrial chemicals, poor hygiene, polluted soil, a weak public-health system, and improper processing, handling, and storage of food. For

example, sea cucumbers were plumped up with formaldehyde. Pork was laced with clenbuteral, an asthma medication to make meat lean. Moldy rice is coated with carcinogenic chemicals to make it look fresh (Dorgan 2002). With the heavily polluted environment in China, a more serious problem may exist in food which comes laid with heavy metals and other toxic agents resident in the soil and water. Such food may not immediately cause illness but cancer, birth defects and other health problems may result in the future (Dorgan 2001). A 6-month survey of 60,085 producers around the country found that 41 percent of small- and medium-sized food companies did not meet minimum health standards, and that 20 percent of large companies did not (Dorgan 2001).

The media have reported mass food poisoning accidents (Dogran 2001, Down Jones Newswire 2001, Lin 2001). For example, food poisoning killed 28 people in China from July-September 2000 (People's Daily 2000). In September 2001, more than 6,000 students in the north-eastern city of Jilin experienced dizziness, vomiting, twitching and other symptoms of food poisoning that were linked to a soybean drink served in school lunch programs (Dorgan 2001).

Another major food safety concern in China relates to bio-technology in food, such as GM foods. In January 2002, China published regulations that required labelling and safety certification for all GM animals and plants entering China for sale, production, processing, or research. Foreign companies selling genetically modified (GM) seed for production or processing, and importers intending to use GM foods for research purposes are required to obtain a safety certificate from China's Ministry of Agriculture.

Distrust of the conventional food industry is another aspect of food safety concerns in China. The Chinese government regulated Green Food, a term similar to

Organic Food. The regulation provides for the appropriate classification, use, and requirements for food products to be labeled "Green Food" and sold on the domestic market. The regulation specifies the environment, fertilizers, pesticides, and other chemicals and the respective dosages that can be used in foods that carry the Green Food label.

The investigation of food safety attributes is useful for Chinese meat consumers through the provision of information. Due to the public goods nature of food safety information, the provision of food safety information may necessitate food suppliers labeling their products or the government inspecting of food products. In the present study, to investigate Chinese consumers' concerns about food safety issues, *free of chemical* and *inspection stamps* and *certificates* were selected and. respondents were asked to rank the two attributes by using a Likert scale.

2.5 Meat Retailing in China

With China's open door policy and the entry into the World Trade Organization (WTO), the retail system is also changing very quickly and increasingly maturing and enjoying a more liberal market regime, with the emergence of supermarkets. The Chinese meat retail market is composed of seven main types of stores: (1) small butcher shops, which are owned by individual; (2) large supermarkets, both foreign owned or joint venture or domestic owned, (3) wet or free markets, the dominant grocery outlets, where the majority of Chinese consumers purchase their meats daily. (4) wholesale markets; (5) private meat shops, which are owned by private individuals, (6) state meat shops where the stores are owned by state; (7) and other meat markets. The three main retail outlets including wet markets, supermarkets, and wholesale markets are described below.

2.5.1 Wet Market

In China, the wet market has been traditionally a dominant meat outlet in China. Our survey revealed that 76 per cent of the respondents purchase most of their fresh meat in wet markets. It is expected that wet markets may continue to play its dominant role in Mainland China's market. Even in highly developed Hong Kong, Taiwan, and Singapore, where people share a similar food culture with Mainland China and where supermarkets have been well developed and present for decades, wet markets continue to dominate the fresh food area. The supermarkets have achieved lower market shares of food retail sales compared to supermarkets in North America and Europe (Goldman et al. 1999).

The wet market offers a conventional retail format as compared to supermarkets. The term *wet* reflects the continuous wetness of the floor as a result of the frequent spraying of produce and the cleaning of meat and fish stalls (Goldman et al. 1999). Wet markets are normally composed of a number of independent small stalls. The stalls are small, family operated, and employ marginal labor using simple methods and technologies. The operations are characterized by a lack of financial management and marketing skills. They are messy, dirty and unorganized (Goldman et al. 1999). Wet markets take many forms, ranging from a few stalls along the side of a street to streets that are temporarily closed with many stalls, to permanently designed market places that may be open-aired or roofed, to purpose-built (sometimes even multi-storied) building provided by the local government (Cai 1999). Chinese consumers shop daily in wet markets and the locations are usually within 15 minutes walking distance from home. Consumers normally buy a little every day since most people do not have cars. Usually, they walk to wet markets or take bikes or buses. Wet markets provide consumers with a

variety of fresh fruit and vegetables, fresh fish and seafood, fresh meats and poultry products.

2.5.2 Supermarket

The supermarket as a new retailing technology was introduced to China in 1981. Initially, supermarkets mainly served visitors from overseas. When the economic environment improved during the 1990s, supermarkets in China shifted focus to the general public. It was only in the early 1990s that supermarkets attained a relatively rapid development in China, especially in Shanghai and other coastal cities (Sha and Li 1992).

Supermarkets in China have their own characteristics. Firstly, in contrast to supermarkets in Western countries, supermarkets in China are usually opened in high population areas and their locations are convenient to the more educated and high-income public. Secondly, price levels in supermarkets are higher than in conventional stores, such as wet markets or meat shops, to allow for additional packaging, processing and transportation costs. The reason for high prices is that most supermarkets did not adopt the high volume low price strategy practiced in Western countries (Lo et al. 2001). Thirdly, supermarkets provide fewer product lines and product items, especially fresh produce. Fourthly, the quality of items carried in supermarkets is considerably better than that in non-supermarket retail outlets. Finally, the supermarkets are mostly run as single independent business units, and the investment scale is usually small.

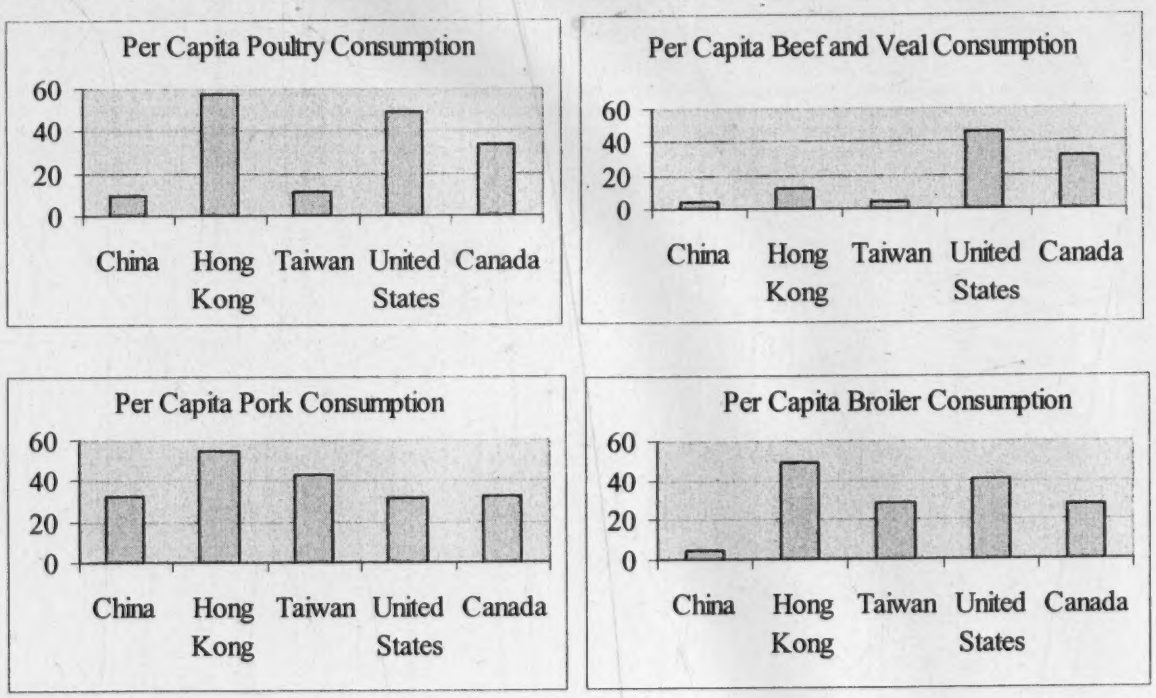
As China is still a developing nation, it takes time for consumers to modify and to change their shopping habits and life-styles. Suppliers in China also need a transitional period to fully comprehend the essence of supermarket operations in lowering costs and increasing efficiency, thus enabling consumers to gain practical benefits through

economies of scale (Sha and Li 1992). However, if economic conditions continue to improve, more consumers are expected to patronise supermarkets, and it is expected that supermarkets will continue to penetrate the market in the future (Lau 1985, Qiang and Harris 1990, Chow and Tsang 1994). In the coming ten years, China may become the largest food market, and the hottest international business competition will be in China. Therefore, the study of Chinese consumers' choices of retail outlets will be important for meat producers and marketers to share the vast meat market in China.

2.5.3 Wholesaler

The distinction between wholesale markets and retail markets for rural produce is not clear-cut in China. According to Cai et al. (1999), traditionally all the larger cities had one or more state-run wholesale markets for fresh food and other rural produce. Nowadays, may of these traditional wholesale markets are struggling to retain a strictly wholesale role in the food distribution chain. There is an increasing tendency for these markets to function at both the wholesale and retail level. However, one important feature of the wholesale market is that food prices at wholesale markets are usually a little bit cheaper than those of wet markets.

Figure 2- 1. Per Capita Meat Consumptions in China Compared to Those of Selected Countries, 2000.



Source: USDA Data (2000)

Figure 2-2 a. Food Expenditure Distribution in China in 1964

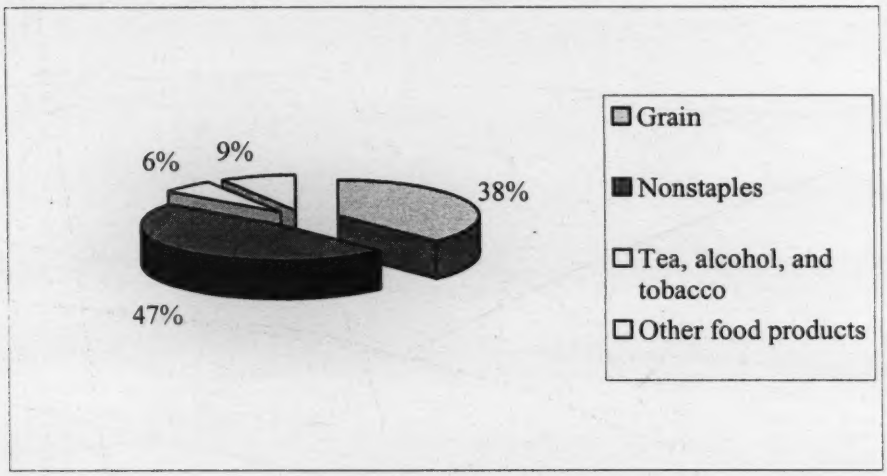
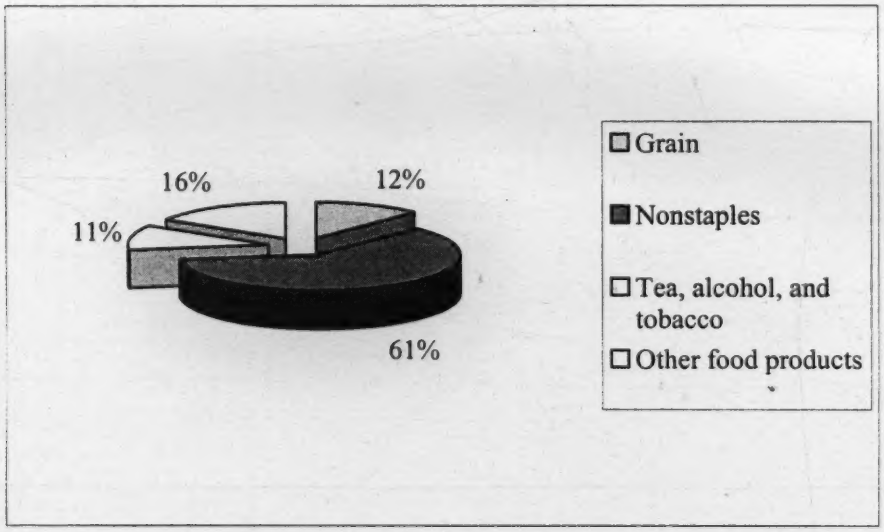


Figure 2-2 b. Food Expenditure Distribution in China in 1990



Source China State Statistical Bureau (1992)

Table 2- 1. Meat Demand and Supply in China for Selected Years (unit: 000' metric tons)

	1980	1985	1990	1995	1996	1997	1998
Beef							
Production	295	467	1,256	4154	3557	4409	4799
Imports	0	0	0	3	3	3	7
Exports	0	15	155	95	79	60	50
Consumption	269	452	1,101	4,062	4,870	5,343	5,757
Per Capita Consumption (kg)	0.3	0.4	1	3.3	2.9	3.6	3.8
Mutton							
Production	445	593	1,068	2015	1810	2128	2346
Imports	1	0	0	2	3	3	3
Exports	0	0	3	3	8	8	8
Consumption	446	593	1,065	2014	2,395	2595	2895
Per Capita Consumption (kg)	0.5	0.6	0.9	1.7	2.0	1.7	2.0
Pork							
Production	11,341	16,547	22,808	36484	31580	35963	38837
Imports	0	0	0	3	2	3	3
Exports	160	263	235	230	192	150	90
Consumption	11,181	16,284	22,573	36,257	40,185	42,353	43,913
Per Capita Consumption (kg)	11.3	15.4	19.7	30.1	25.8	29.2	31.3
Poultry							
Production	1,225	1,592	3,229	9,347	10,746	11,500	12,500
Imports	0	30	68	625	850	900	850
Exports	109	263	110	390	410	435	430
Consumption	1116	1,359	3,187	9,582	11,196	11,965	12,920
Per Capita Consumption (kg)	1.1	1.3	2.8	7.3	8.2	8.8	9.0

Source: USDA(2000) revised data

Table 2- 2. Estimated Income and Price Elasticities in China

Item	Income Elasticities		Price Elasticities	
Item	Urban[1]	Rural[2]	Urban	Rural
Fish	3.41	0.95	-0.67	-0.35
Poultry	3.12	0.70	-1.28	-0.50
Pork	1.68	0.67	-1.59	-0.66
Beef and Veal	N/A	0.65	N/A	-0.38
Eggs	0.55	0.41	-1.81	-0.91
Vegetable oil	0.38	0.34	-0.41	-0.58
Vegetables	0.20	0.36	-0.43	-0.48
Fruit	0.21	0.62	-0.88	-0.94
Grain	0.11	0.32	-0.16	-0.37

Note: N/A = not available

[1] Based on pooled provincial-level data from 30 cities and provinces, 1993-96.

[2] Based on rural household survey data from Jiangsu Province (976 households) in 1994

Source: Chern et al. (2000)

Chapter 3. Literature Review

3.1 Previous Studies on Food Attributes

Consumer preferences towards food products are traditionally studied under the framework of the Marshallian and Hicksian demand functions, assuming a finite number of homogeneous products. However, consumers usually compare several different brands before deciding which option to purchase. For example, a consumer at a grocery store might compare the attributes of different meat products before purchase. With changing consumer preferences, specific attributes or sets of attributes of food products such as colour, taste, freshness, and others have become increasingly important in influencing consumer purchasing decisions. In a market, firms constantly produce differentiated products and develop new or modified products to capture niche markets. Thus, the conventional approach that assumes that goods are homogenous may not adequately deal with a market with heterogeneous goods. Lancaster (1966) developed a consumer demand theory in which consumers view goods as a bundle of attributes or characteristics, not as goods *per se*.

Lancaster's demand theory, which deals with a bundle of characteristics, is widely used in marketing literature. There have been numerous empirical studies examining consumer preferences or attitudes towards product attributes using the Lancastarian framework of demand analysis (Baker and Burnham 2001, Thompson and Kidwell 1998, Nauman et al. 1995, Baker and Crosbie 1993, Putnam 1993, Mancheser 1992, Senaurer et al. 1992, Menkhaus et al. 1988, and Adrian and Daniel 1976). Evidence from these studies showed that consumers have preferences for some attributes over others and that consumers' socio-economic, demographic and geographic characteristics can play

important roles in determining consumer attitudes toward and preferences for food, food purchases and food consumption.

Menkhaus et al. (1988) applied a logit model to identify the determinants of purchase and re-order decisions concerning a branded, low fat and fresh beef product in the U.S. Their results revealed that visual characteristics significantly affect meat purchasing decisions. Similarly, U. S. consumers' decisions to purchase fresh hybrid striped bass, trout and salmon were investigated using a logit model (Nauman et al. 1995). The results from this later study concluded that characteristics such as farm raised products, previous experience with purchasing seafood, healthfulness, and taste of sea food were important in influencing consumers' decisions to purchase fish products.

Similarly, Thompson and Kidwell (1998) empirically estimated a two-equation probit model to investigate the choice between organic and conventional products. They found that shoppers at specialty grocer stores were sensitive to price differences between organic and conventional items. Again, a study by Hui et al. (1995), using telephone household survey data in Louisiana and Texas during February 1993 in the United States, revealed that freshness, taste, appearance, and nutrition are important meat attributes. They also investigated the relationship between the importance ratings and consumers' geographic and socio-economic characteristics. Their results indicated that older, married, low-income, and non-white consumers were price conscious, and that the USDA (United States Department of Agriculture) label had become an important symbol of meat quality and safety for older, female, Baptist, and high-income consumers.

Following similar approach, Chen et al. (2002) examined the preference rankings of thirteen attributes of fresh pork based on data from consumers of Asian origin in San-

Francisco, California. Their results indicated that freshness is the most important attribute, followed by the color of meat, lowness in fat, and the whiteness of fat attributes. They suggested that Asian-origin consumers should not be treated as a single homogeneous niche group in marketing since there were identifiable sub-groups of these consumers with specific attitudes and preferences.

Nayga (1997) employed an ordered logit model to examine how the perception of a household main meal planner concerning the importance of nutrition in food shopping is related to socio-demographic characteristics based on data from a Diet and Health Knowledge Survey in 1991 in United States. The socio-demographic variables were household size, race, sex, employment status, urbanization, age, income, education and region. Nayga's study suggested that black, female, highly educated, and non-working main meal planners generally perceived nutrition as more important in food shopping than did others. His results also suggested that nutrition was more important to main meal planners who resided in cities and in the south.

Another important series of studies examined consumer preferences and attitudes from food safety perspectives (Kim and Chern, 1995; Baker and Burnham, 2001; Eom, 1995; Weaver, 1995; Weiss 1995; Lin and Milon 1995; Fox et al. 1995; Halbrendt et al.1995a; Halbrendt et al. 1995b; and Misra et al. 1995). Kim and Chern (1995) applied the hedonic price method to estimate the value consumers placed on various fatty acids contained in major fats and oil consumed in the U.S. According to their study, consumers placed a higher value on un-saturated fats than saturated fat; consumer health information played an important role in household choice among substitute in food consumption; and

consumers take health concerns more seriously than food processors or food-away-from home providers did.

Next, Baker and Burnham (2001) studied the relationship between consumer characteristics and food safety concerns, using a conjoint analysis survey conducted in 2000 in the U.S. A binary logit model was used to analyze consumer characteristics associated with the acceptance of GM food. Those consumers who were the most risk averse, the most likely to believe that GM technology improved the quality or safety of foods, and the most knowledgeable about biotechnology were the most likely to accept GM food.

As far as the methodological issues are concerned, there are a number of methods used to empirically investigate consumer preference for product attributes. The methods include hedonic price analysis, conjoint analysis, contingent analysis, and experimental auction. So each method has its own strengths and weaknesses.

Hedonic price analysis is a widely used methodology to study consumer preferences and food attributes, including rice (Kawamura 1999, Brorsen et al. 1984), apples (Carew 2000), fats and oils (Kim and Chern 1995), beef (Wahl et al. 1995), barley (Wilson 1984), wheat (Veeman, 1987), and cotton (Ethridge and Davis 1982). Hedonic prices are defined by Rosen (1974) as the implicit prices of attributes and are revealed to economic agents from observed prices of differentiated products and the specific amounts of characteristics associated with them. Hedonic price function captures the relationship between the observed price and the amount of each characteristic contained in the product. It assumes that consumers obtain utility from consuming the characteristics of good in question. That is, the characteristics rather than the goods per se are arguments in

an individual's utility function. Hedonic price theory was further developed into a household production theory by Becker (1965), Lancaster (1966), Muth (1966) and others.

For example, Kawamura (1999) examined demand for cooked rice packages in Japan using a hedonic price analysis. Kawamura's results suggested that producers should use rice produced in Nijgata, that the package should have the name of the product vertically printed on it. It also suggested that the package should not have a transparent part through which consumers could see the contents, and the area indicating barcode information should be small. Kawamura's result also showed that prices at stores near railway terminal were expensive, and that larger stores supplied products at lower prices. Similarly, Carew (2000) estimated a hedonic price function relating apple prices to product market quality characteristics for British Columbia over three marketing years (1994-96). Carew found that grade, cultivar, storage and marketing season were the most significant variables influencing apple prices and that the quality and market characteristics of apples had important implications for the merchandising strategy of packers and marketers.

Another method which is used to study consumers' demand for product characteristics is the contingent valuation (CV) method. The contingent valuation approach asks respondents' willingness to pay for a specific good in a hypothetical market scenario. CV methods encompass personal interviews, mail surveys and telephone surveys which elicit consumers' willingness to pay (WTP) for non-market goods "contingent" on a given hypothetical scenario (Buzby et al. 1995). The CV method is generally considered as an important alternative for measuring the non-marketed goods

(Buzby et al. 1995, Van Ravenswaay and Wohl 1995, and Halbrendt et al. 1995a). For example, attributes of goods, such as food safety and nutrition, are non-marketed goods. To elicit respondent valuation of non-marketed goods, a survey is usually used to implement contingent valuation. A common application of CV for food safety issues is to present respondents with a hypothetical scenario and ask them to name a price that is the most that they are willing to pay above the normal purchase price of a good to avoid or reduce a particular food safety risk.

The CV method is different from the hedonic price model. First of all, the hedonic function is estimated with market price and consumption data and characteristics observable in the consumption decision. Therefore, the hedonic price method provides objective valuation of attributes such as nutrition and fats while the CV method deals with the subjective valuation of attributes such as food safety. Another distinction, in practice, is that the hedonic price analysis is typically estimated with historical data (time series or cross-sectional), while the CV method relies on survey data (Kim and Chern 1995).

The CV method has several advantages. One primary advantage of CV is that it is a flexible tool that can be tailored to analyze specific food safety policies (Buzby et al. 1995). Past researches have shown that CV methods generate results that are comparable in terms of accuracy to analogous results from other approaches that value non-marketed goods. Other strengths of CV surveys are that they tend to be less expensive than actual market experiments, and CV does not rely on secondary data sources originally developed for other needs. However, CV's reliance on consumers' subjective responses makes the results vulnerable to several potential biases. One concern with CV is that

elicited values may inflate what consumers would actually pay because consumers take hypothetical scenarios less seriously than real-life situations.

Empirically, Halbrendt et al. (1995a) applied the CV approach to value consumer willingness to pay for reduced saturated fat in pork. They designed a national contingent valuation consumer survey in the U. S. to collect data on consumers' willingness to pay to consume pork products with a 25 and 50 percent reduction in saturated fat. Their results confirmed that if the level of saturated fat was reduced, pork consumption would increase. Overall, survey respondents were willing to pay (on average 16-23 cents) more per pound for fresh pork with reduced levels of saturated fat.

Conjoint analysis (CA) is another approach to the study of consumer demand for product attributes. Since the early 1970s, conjoint analysis has received considerable academic and industry attention as a major set of techniques for measuring buyers' tradeoffs among multi-attributed products and services (Green and Srinivasan 1978). CA has gained widespread acceptance because of its predictive ability and its value in providing an understanding of the structure of consumers' preferences. In a conjoint experiment, respondents are asked to rate (or rank) a number of product profiles consisting of several attributes including price. Then an analysis of variance or regression is used to fit a model that allows researchers to examine the relative importance of the attributes and the possible tradeoffs between them. Through the calculation of different product profiles with equivalent ratings, a set of products with different attribute levels can be created for marketing purposes.

Conjoint analysis (CA) has its strengths and weaknesses. A major advantage of CA over the CV method is that consumers respond to a more realistic market situation.

They are asked to evaluate various products, a task similar to an everyday market situation. In comparison, the CV method typically uses survey data, in which consumers state directly how much they would be willing to pay for a product attribute. CV methods allow only the estimation of aggregate demand functions (Baker and Crosbie 1993). On the other hand, CA methods were strained by requiring larger numbers of attributes and levels within attributes, thus placing severe information overload on respondents. (Green and Srinivasan 1990).

Several studies applied the CA method to investigate consumer preferences for food attributes (Halbrendt et al 1995b, Baker and Crosbie 1993, and Huang and Fu 1995). Halbrendt et al (1995b) studied Australian consumer preferences for porcine samototropin (pST)-supplemented pork using the CA method. The results indicated that products with the greatest level of fat reduction received the highest ratings, that the products with no fat reduction received the lowest ratings and that consumers would be willing to consume pST pork, but were not willing to pay a premium unless they achieved leanness beyond what current technology can achieve. Similarly, Baker and Crosbie (1993) applied the CA method to estimate individual preference functions for food safety attributes for fresh apples. They found that the level of damage was the most important factor in determining consumer preferences for apples. Huang and Fu (1995) designed a conjoint experiment to survey and analyze a sample of Taiwanese housewives for their evaluations of various Chinese sausage attributes.

Another approach in the study of consumer demand for product attributes is the experimental auction (EA) method. Theoretical and experimental economists have applied laboratory experimental auction extensively for nearly 30 years. Laboratory

experimental auctions are used to forecast consumer demand and to determine the market potential of new products. There have been a lot of studies that have applied the experimental auction method (Melton et al. 1996a, Melton et al. 1996b, Hoffman et al 1993, and Buhr et al. 1993). One important advantage is that laboratory experimental auctions provide an endogenous revelation of the prices consumers are willing to pay for the products being tested (Hoffman et. al.1993). Laboratory experimental auctions have a structural disadvantage in that the bidding mechanism does not naturally mimic how consumers reveal preferences in grocery stores or in other common purchase settings (Hoffman et al. 1993).

Buhr et al. 1993, for example, used the Vickery auction and repeated market trials to elicit how much individuals would be willing to pay to eat, or avoid eating a leaner meat product produced by using growth enhancers. Similarly, Fox et al. (1995) applied an experimental auction to value consumers' willingness to pay for reduced risk from pathogens in meat products. More recently, Melton et al. (1996a) tried an application of the experimental auction method, using both experimental economics and experimental design, to evaluate consumer perceptions and willingness to pay for fresh pork chops. Their study concluded that market prices and consumers' willingness to pay for fresh pork were related to the level of attributes, appearance and actual taste, embodied in the pork chops. In another study, Melton et al (1996b) applied experimental auction data to evaluate consumer perceptions, willingness to pay, and attribute values for fresh pork chops that differ simultaneously in multiple quality attributes: color, marbling and size. The experimental auction has the property that it is in the best interest of the participants to reveal their true valuation for the item being auctioned. Experimental auctions have

been generally promoted as a tool to help to improve the contingent valuation (CV) of non-market goods.

The present study proposed self-explication approach to elicit consumers' perceptions of attributes of selected fresh meat in Hangzhou and Shanghai. The advantage of the approach is that it is simple to use, particularly when large numbers of attributes are of interest as is the case in this study. Empirical results have suggested that this approach is likely to yield predictions that are generally comparable to those of conjoint analysis (Green and Srinivasan 1990). Conjoint analysis works well when there are only a few (say six or fewer) attributes. It strains the methodology by requiring larger numbers of attributes and levels within attributes, thus placing a severe information overload on the respondents. When faced with such tasks, respondents resort to simplifying tactics and the resulting estimates may distort their true preference structure.

3.2 Previous Studies on Chinese Food Consumption

As food consumption patterns have changed dramatically, a number of studies on Chinese household consumption patterns and demand analysis have been carried out. There are two characteristics for these studies. First, all of the studies made use of household survey data (Van der Gaag 1984, Li et al. 1985, Lewis and Andrews 1989, Chern and Wang 1994, Fan et al. 1994, Halbrendt et al. 1994, Fan et al. 1995, Han and Wahl 1998, and Jassaume 2001). Second, these studies have been conducted using either a broad group of commodities such as food, clothing, fuel, and housing, or a whole food group such as grain, oil, vegetables, fruits, alcohol and tobacco and meats. However, few studies have been done on specific food items, such as meat consumption in China.

Lewis and Andrews (1989) modeled demand for food, clothing, housing and miscellaneous for household data in 1927, what is now Beijing and for 1929 data for Shanghai. Linear expenditure systems (LES) were applied to examine the food consumption in rural households in Hubei province and urban households in Beijing for 1981 and 1982 (Van der Gaag, 1984; Li et al. 1985). Following the same approach, Lewis and Andrews (1989) employed LES to estimate urban and rural household demand for broad commodity groups and food subgroups, but not for individual food items in China. The broad groups in their study were food, clothing, daily articles, other commodities and non-commodities. The food subgroups were staple foods, non-staple foods, tobacco, liquor and tea, and other foods. Similarly, Chern and Wang (1994) applied both LES and the quadratic expenditure system to investigate the food demand system for Chinese urban households The broad food group included grain, oil, vegetables, dried vegetables, pork, beef, poultry, eggs, fish and fruits. But again, it did not investigate a specific food item.

More recently, Fan et al. (1994) used the almost ideal demand system (AIDS) to estimate various food demand parameters for Chinese rural households using provincial aggregate time-series data for a rural household survey from1982 to1990. The results showed that rice, wheat, coarse grains, vegetables, meat, tobacco, and alcohol had positive expenditure elasticities. Rice, wheat and coarse grain were necessities, while meat, vegetables, alcohol and tobacco were luxuries. The expenditure elasticities for rice, coarse grains and tobacco were declining, but those for wheat, meat vegetables and alcohol were increasing. As per capita income increases, the demand for these items will continue to increase.

In another study, Fan et al. (1995) applied a two-stage LES-AIDS model for pooled provincial and time-series data to investigate household demand for commodity groups and food group in rural China. Similarly, Halbrendt et al. (1994) applied the AIDS model to examine rural Chinese food consumption in Guangdong, investigating the price and expenditure elasticity for commodity groups (food, clothing, fuel, housing and other commodities) and broad food group (rice, wheat, meat, vegetables, alcohol and tobacco). Recently, Han and Wahl 1998 applied a two-stage budgeting model to investigate rural household demand for fruit and vegetables.

There is very limited research on consumer preferences towards meat attributes in China (Gu 1995 and Cai 1999). To gain a better understanding of Shanghai consumers' food purchasing habits, the United States Agricultural Trade Office in Shanghai commissioned the Gallup Organization to conduct a survey among 400 randomly selected Shanghai consumers (Gu 1995). Face to face interviews were conducted in Shanghai neighborhoods in November 1995. The survey result indicated that the most popular grocery outlets today were wet markets. In Gu's (1995) study, food sanitation and quality, nutrition value, taste, price, and value for the money were cited as important factors influencing consumers' purchase decision. Advertising and packaging were not considered as significant factors affecting food-purchasing decisions, while the country of origin was rated the least important attribute in consumers' purchase decision.

In another study, Cai et al. (1999) examined the agribusiness opportunities being generated by the rapid development of the Chinese cattle and beef industry, based on a consumer survey in Jiangsu province and Shanghai in China in 1997-1998. The study found out that wet-market was the most popular shopping sites for household. Chinese

consumers considered good taste, healthy and change of taste as the three most important reasons to consume beef. Chinese consumer also considered that beef was leaner and had less fat than pork and chicken. The consumers regarded freshness, cleanliness and hygiene more important than tenderness or juiciness; the mass market was very price sensitive and there was a strong positive relationship between household incomes and beef and beef offal consumption, very few respondents had experienced imported beef or beef offal.

3.3 Previous Studies on Store Choice

Previous studies on store choice can be seen from different perspectives depending on the purpose of the study. One of the perspectives of consumer choice study focuses on the relationship between shoppers' trip frequency and their demographic characteristics. For example, Doti and Sharir (1981) developed and tested a model of a grocery shopping trip to explain the impact of household characteristics on grocery shopping behaviour. Similarly, Blaylock (1989) found the fact that a household's shopping frequency was influenced by the shopper's race, household size, and shopper's age. Bawa and Ghosh (1994) found that households with large family size, older household head and fewer employed members were more frequent grocery shoppers.

The second perspective of consumer choice studies is related to consumer grocery shopping patterns or trip regularity. Kahn and Schmittlein (1989) classified consumers into two segments, "Quicks" and "Regulars", by employing the amount of money spend as an exogenous variable, they found that "regulars" made grocery shopping trips mainly in weekly intervals. Similarly, assuming that consumers are heterogeneous in terms of their trip regularity, Kim and Park (1997) found clear difference between "random" and

"routine" shoppers in terms of several demographics and purchase behaviour characteristics. The "routine" shoppers are identified to have higher opportunity costs, which make it difficult for them to visit grocery stores more often and/or to switch stores. However, they spend more dollars for a given shopping trip, which implied the importance of segmenting shoppers by their shopping trip regularity.

The third perspective of consumer store choice study is related to store attributes. Several studies have been done in various countries on store attributes, commonly called store image variables in marketing literature (Lindquist 1975; May 1975, Gensch and Recker 1979; Pessemier 1980; Tigert 1983; Woodside and Trappey 1992; Medina and Ward 1999). It is generally accepted that chain image is an important determinant of store choice. The objective of these types of studies is the identification of key attributes that influence consumers' store choice. These key attributes have often been discussed as "determinant" attributes.

Woodside and Trappery (1992), used a multinomial-logit model to investigate consumer store choice. They found that low prices, large selection, and a convenient location were the three reasons mentioned most often by respondents for shopping at their named primary store. Medina and Ward (2000) also applied multinomial logit models to discover determinants of consumer outlet selection when buying beef. They grouped outlets into supermarkets, butchers, warehouses, super-centers and others. Then, the probability of selecting each outlet type over a range of demographic and other variables was investigated. Variables such as household size, income, age, female employment level, market size, seasonality were found to influence store choice. In addition, the study suggested that the type of beef and size of the beef purchase played an

important role in the outlet choice. Similarly, Schuler (1979) pointed out that grocery shoppers were primarily concerned with the quality and price of merchandise. This result substantiated several hypotheses in the consumer-behaviour literature concerning the importance of these variables. Of lesser importance to the decision-maker process are traveling distance, speed of service, and nearness of parking.

The fourth aspect of store choice research is the influence of personal attributes, such as socio-economic and demographic individual characteristics such as sex, race, income, and educational level. Put differently, store selection is likely tied to the characteristics of the consumers (Medina and Ward 2000). It is useful to be able to forecast the patronage at a store in terms of consumer type in order to anticipate the demand for a specific product and to generate more-realistic marketing strategy to improve total sales.

In the same vein, Hubbard (1978) conducted a comprehensive survey of literature on consumer choice and suggested that consumers' socio-economic status did affect the way in which he or she perceived store image and store selection. Similarly, Fotheringham and Trew (1993) identified the characteristics of consumers that affected their decisions to patronise store indicating that income and race play an important role on their store selection. It appeared that low-income consumers were willing to travel further for grocery shopping, *ceteris paribus*, probably to take advantage of lower prices. Higher income consumers might be unwilling to spend the extra time involved to shop at the stores with the lowest prices and therefore give up low prices for the sake of convenience. To obtain a clear understanding of consumer behavior, Schuler (1979) applied cluster analysis to segment the market. Two clusters were identified. Cluster 1

was composed of respondents characterised as younger, married and living in childless households; cluster 2 consisted of older, married and household size of one or more.

Few researches have investigated the important determinates of Chinese consumers' choice of retail outlets, and the effects of consumers' characteristics on their choices of retail outlets. However, in a broader area, a few studies have investigated the changing food retailing system in China (Chow and Tsang 1994, Lo et al. 2001, Qiang and Harris 1990, and Sha and Li 1992). For example, Qiang and Harris (1990) summarized the retailing reform and trends in China, pointing out that retailing sector in China remained underdeveloped compared with that of other developing countries in Asia though remarkable progress had been achieved since the economic reforms. They predicted that as economic reforms continue in China, retailing market reforms will be deepened. Chow et al. (1994) discussed the distribution reform in China, including retail and wholesale levels, and identified the two most important factors which brought the rapid development of private retailing sector, the relaxation of government policy and change in consumption patterns since China's open door policy. More recently, Lo et al. (2001) examined determinants of supermarket growth in China and they found that the nature of problems faced by supermarkets changed over time during the past eighteen years. In the 1990s, the growth problems of supermarkets were mainly related to competition and management issues. With economic growth in China and its huge consumer market, the study predicted that the retailing part would soon become more competitive. It also predicted that supermarkets would become a new power in the retailing industry in China.

To sum up, very limited research has been conducted on Chinese consumers' preferences toward meat attributes; and even fewer quantitative studies have investigated the important determinates of Chinese consumers' choices of retail outlets, and the effects of consumers' characteristics on their choices of retail outlets. As China moves toward a more liberated market economy, information on consumer preferences toward meat products, and their choice of retail outlets are becoming important for China's policy makers for assessing the effects of alternative policies, for producers to predict market demand, for foreign exporters to predict China's imports and exports. The present study attempts to identify how Chinese consumers rank a variety of selected attributes of fresh meat and evaluate the effects of socio-economic and demographic characteristics on the preferences for the selected meat attributes. The goal is to investigate consumers' perceptions about various attributes of retail outlets and to examine the effects of consumers' social-economic and demographic characteristics on their choice of retail-outlets. It is hoped that this study will offer some insights for exporters, retail marketers, and policy makers in the meat sector at present and in the future.

Chapter 4. Methodology, Survey Design and Data Collection

4.1 Introduction

The economic theory underlying this study is outlined in this section. The study consists of two parts: consumers' perceptions of meat attributes and retail outlet choices. To model consumers' perceptions of meat attribute, the Lancaster characteristics model is adopted. The Lancasterian characteristic model and the random utility framework are used to study the consumers' choices of retail outlets. Next, how the survey was designed for this study, how the target areas were chosen and how the data were collected are discussed

4.2 Conceptual and Empirical Model for Preferences on Meat Attributes

The Lancaster's theory of demand for attributes provides a theoretical framework for studying consumers' preferences for fresh meat attributes. Lancaster (1966) stated that goods are comprised of attributes. Consumers purchase goods because of the attributes or characteristics they have rather than the goods per se. For example, decisions to purchase fresh meat are based on attributes such as freshness, food safety, price, taste, flavor, convenience, appearance and so on. Put differently, utility is derived from the characteristics or properties of the good (i.e., meat attributes) rather than the good itself – meat (Lancaster, 1966). In this study, a consumer's utility function associated with the purchase of fresh meat is expressed in terms of relative importance rankings for selected fresh meat attributes. It is hypothesized that the rankings are determined by a vector of consumer's socio-economic and demographic characteristics, w. The utility function, U, is not observable, but is assumed to underlie the observed vector of importance rankings, R (where R=0, 1, 2…j) (Chen et al. 2002). The model for estimating the impact of

consumers' socio-economic and demographic characteristics on the importance rankings of meat attributes is specified as:

$$U = \beta w + \varepsilon,\ \varepsilon \sim N(0,\ 1) \tag{4-1}$$

$$R = \begin{cases} 0 & if\ U \le 0 \\ 1 & if\ 0 < U \le \mu_1 \\ 2 & if\ \mu_1 < U \le \mu_2 \\ \vdots & \\ j & if\ U > \mu_2 \end{cases} \tag{4-2}$$

where μ_j's are threshold variables or cut-off points of the relative importance rankings for each attributes and ε is the error term. β is a vector of parameters to be estimated. The cut-off points vary with individuals. Individuals with similar tastes and backgrounds are expected to have similar cut-off points (Maddala 1983).

In many studies, researchers try to describe goods by using exhaustive lists of attributes (Jones 1988, Englin and Mendelson 1991) as is the case in this study. Unfortunately, it is difficult to know in advance which attributes are indeed relevant. A large set of attributes may be highly correlated. For example, *meat cut to your specification* and *purchase convenience* may be an indication for latent convenience attributes. The simultaneous rankings of a large number of highly correlated attributes are known to lead to spurious results in attempts to value components of meat quality (Jobson 1992). In this study, in order to reduce the number of attributes to a few categories and to represent latent attributes as characteristics that enter the consumers' utility function, a factor analytic approach was adopted (Jobson 1992). Originally, according to Thurstone (1947), "the factorial methods were developed primarily for the

purpose of identifying the principal dimensions or categories of mentality." In this study, the factor analysis method is used to model the relationship between the observable attributes and unobservable latent outcomes with the added advantage of reducing the number of attributes.

Factor analysis regroups large set of attributes into a smaller number of latent attributes. Using factor analysis, factor scores can be calculated for each latent attributes. Factor scores are standardized values with mean of zero and variance of one. The larger a factor score, the higher a rank is assigned to a specific latent attribute. Factor scores of latent meat attributes will replace the original rank of meat attributes. The model is then specified as follows:

$$F = \beta w + \varepsilon, \ \varepsilon \sim N(0, 1) \tag{4-3}$$

where F is the factor score of the latent meat attributes such as food safety, appearance, nutrition, healthiness, price and convenience.

Since factor scores are standardized values, the common statistical technique for estimating the influence of various socio-economic and demographic characteristics on consumers' perceptions of meat attributes is to apply ordinary least square (OLS) regression analysis (Greene 1997). The regression model can be given as follows (Greene1997):

$$F = \beta w + \varepsilon \tag{4-4}$$

4.3 Conceptual Framework for Choices of Retail Outlets

The conceptual framework for the study of choice of retail outlet is based on the concept of Lancastrian characteristics explained in section 4.2.1 above. In the choice of

retail outlet section, as is the case in meat attribute ranking, whether we work with random utility or demand function, implicit in the analysis is the idea that the Lancastrian characteristics enter directly into the consumer's utility function.

The concept of the random utility model (RUM) in the choice of retail outlets, in which the retail outlets are described by different sets of attributes, is applicable in this study. Random utility theory assumes that individuals try to choose an alternative that yields the highest utility. The expected utility of a choice is viewed as a function of the attribute of choices and relevant personal characteristics of the decision makers, such as age, education and income. However, the utilities are not known to the analyst with certainty and are therefore treated by the analyst as random variables. The "random" component of random utility theory relates to those attributes and personal characteristics not observed by researchers. For respondent i faced with J choices, suppose that the utility of choice j is

$$U_{ij} = V_{ij} + \varepsilon_{ij}. \tag{4-5}$$

where U_{ij} is the utility of alternative j for individual i; V_{ij} is an indirect utility function and the systematic component or 'representative utility'; ε_{ij} is a random component, which is an unobservable component of the total utility due to many hidden factors such as unobserved attributes, unobserved taste variations, measurement errors, imperfect information, and instrumental (or proxy) variables (Ben-Akiva and Lerman 1985). The key assumption is that individual i will choose alternative j if and only if

$$U_{ij} \geq U_{ik} \text{ for all } j \neq k, \tag{4-6}$$

so equation (1) can be rewritten as:

$$V_{ij} + \varepsilon_{ij} \geq V_{ik} + \varepsilon_{ik}, \tag{4-7}$$

Rearranging to place the observable and un-observable together yields:

$$V_{ij} - V_{ik} \geq \varepsilon_{ik} - \varepsilon_{ij}, \tag{4-8}$$

The analyst does not observe $(\varepsilon_{ik} - \varepsilon_{ij})$, and hence cannot determine exactly if $V_{ij} - V_{ik} \geq \varepsilon_{ik} - \varepsilon_{ij}$. One can make statements about choice outcomes only up to a probability of occurrence. Thus the analyst has to calculate the probability that $(\varepsilon_{in} - \varepsilon_{jn})$ will be less than $(V_{jn} - V_{in})$. This leads to the following equation:

$$prob(j) = prob\left[V_{ij} - V_{ik} \geq \varepsilon_{ik} - \varepsilon_{ij}\right] \quad \text{for all } j \neq k, \tag{4-9}$$

The probability of selecting a specific retail outlet depends on the attributes of the selected retail outlet relative to the attributes of other retail outlets in the choice set. Let Y_i be a random variable that indicates the choice made, and if and only if the random component ε_{ij} is independently and identically distributed (IID) as Weibull density functions, the probability of choosing an alternative j can be expressed as:

$$prob(Y_i = j) = \frac{\exp(V_{ij})}{\sum_{j=1}^{J} \exp(V_{ij})} \tag{4-10}$$

Suppose the utility of choice j is

$$U_{ij} = \beta' z_{ij} + \varepsilon_{ij} \tag{4-11}$$

(4-8) can be rewritten as follows:

$$prob(Y_i = j) = \frac{e^{\beta' z_{ij}}}{\sum_{j=1}^{J} e^{\beta' zij}} \qquad (4\text{-}12)$$

This leads to what is called the conditional logit model.

The conditional logit model has been widely used due to its simple mathematical form, ease of estimation and ability to add or remove choice alternatives (Srour and Kockelman 2001). The simplicity in estimation is related to the fact that the solution for the estimated parameters is unique. Ease of estimation is related to the accessibility and ease of using packaged estimation software. Furthermore, when one has very rich and highly disaggregate data on attributes of alternatives and respondents, the model is often very robust in terms of prediction accuracy (Louviere et al 2000).

4.4 Survey Design

The purpose of the survey was to solicit information on respondents' perceptions of selected meat attributes, respondents' perceptions of various store attributes, respondents' choices of retail outlets to purchase fresh meat products, and their socio-economic and demographic characteristics.

The survey was developed from previous literature on meat marketing studies (Cai 1999, Hui et al. 1995, Chen et al. 2002, Menkhaus et al.1993, and Nayaga, 1995) and store choice literature (Woodside and Trappey 1992 and Schuler 1979). These studies provided a guideline for the design of the questionnaire. The survey instrument is presented in Appendix 1. The questionnaire was designed in consultation with meat retailers and wholesalers in Hangzhou and Shanghai. A pre-test was conducted before the field interviews to ensure that important meat attributes and attributes of retail outlets

were captured in the questionnaire. The pre-test was done with shoppers in Hangzhou, following assessments of an earlier version of the survey designed in Edmonton, Alberta, Canada. The pre-test helped to determine the appropriate length of the questionnaire. To gain better information from the survey and to ensure a high respondent rate, it was designed to take approximately fifteen minutes to complete the whole questionnaire.

The survey includes a total of eighteen fresh meat attributes. The specific eighteen meat attributes include n*o chemical additives, tenderness inspection stamp and certifications, leanness, freshness, color of meat, flavor, whiteness of fat, variety in cuts & forms, seasoned and ready-to-cook meat, proper packaging, purchase convenience, meat cuts to your specifications, competitive price, knowing where meat comes from, smell, healthiness (e.g. low in fat),* and *cleanliness.*

The self-explication approach was adopted to elicit information on consumers' perceptions of attributes of fresh meat in Hangzhou and Shanghai (Green and Srinivasan 1990, p 9). First, the respondents were asked to evaluate the importance level (rating) of each attribute, using 1 to 5 Likert scale, with 1 being "not important at all" and 5 "extremely important". Next, respondents were asked to rank 10 groups of meat attributes from 1 to 10, where 1 represents "the least important" attribute and 10 "the most important" attribute). The respondents' importance rating for each attribute, termed the part-worth of the attribute in the marketing literature on attribute evaluation, can be obtained by multiplying the rating for each attribute by its comparative rank.

The section of retail outlets has three parts. The first part of the retail outlet section asked a respondent to specify the retail outlet where he/she buys most of the meat products. The six retail outlets identified in the study were small butcher shop,

supermarket, wet/free market, wholesaler, meat shop and other. "Other" includes those that do not fit into any one of the five categories.

The second part of the retail outlet section asked respondents to evaluate selected characteristics of retail outlets based on their experience. The purpose of the question was to extract information on what features of retail outlets influenced respondents' choices and why he/she chose a particular retail outlet over another. As mentioned in Chapter 3, there are a number of attributes of retail outlets that may influence consumers' choice of retail outlet. However, not all these attributes could be included in the present study due to the limited length of the questionnaire. The characteristics selected in study were those that had been identified by studies on grocery store choice (Tigert 1983 and Woodside and Trappey 1992) and from discussions with meat retailers and wholesalers in Hangzhou. The seven attributes of retail outlets included in this study were *overall meat price, overall meat quality, location of retail outlet, customer service, shopping environment, meat certification, and meat selection*. Respondents were asked to mark the attributes using a Likert scale from 1 to 5, with 1 representing the lowest level and 5 representing the highest level. For example, respondents were asked to evaluate the *overall meat price* offered by wet market, butcher shop, supermarket, meat shop and wholesaler, with 1 representing inexpensive and 5 representing expensive. Respondents were asked to evaluate the other six attributes of retail outlets across the five retail outlets as well.

The third part of the retail outlet section inquired respondents' socio-economic and demographic characteristics, information such as gender, age, household size, income, education, religion, race and nationality. Socio-economic and demographic

characteristics are the most popular bases for segmenting customer groups. Kotler and Armstrong (2001) suggested two reasons to collect socio-economic and demographic variables in marketing research. First, consumer needs, wants and usage rates often vary closely with demographic variables. Second, demographic variables are easier to measure than most other types of variables. Even when market segments are first defined using other bases, such as benefits sought or behaviour, their demographic characteristics must be known in order to assess the sizes of the target market and to reach it efficiently.

4.5 Survey Area

Shanghai and Hangzhou were chosen as the target cities for the survey. To gain a better understanding of the locations of the two cities, please refer to figure 4-1 (a map of Shanghai and Hangzhou). Shanghai is the most international of all Chinese cities and the Shanghainese often set the dining, fashion and lifestyle trends for China. It is the port city at the mouth of the Yangtz River and the gateway to Eastern China's 200 million consumers. Hangzhou is located on the low reaches of Qiantang River in southeast China, with a distance of 180 kilometers from Shanghai. Hangzhou is an important key city of economy on the south wing of Yangzte Delta. Both cities are among the richest cities in China. A better understanding of consumers' characteristics, their preferences toward meat attributes and retail outlets can help meat marketers to have a better understanding, develop effective strategies to target the markets and provide a forecast for the rest of China in the future. Another important reason for choosing Shanghai and Hangzhou is that our collaborators are in the two cities, which make the data collection part much easy and convenient.

4.6 Data Collection

Surveys are an efficient way of gathering information from a large sample of consumers by asking questions and recording response (Blackwell et al. 2001, p22). Several types of methods of data collection were considered. Telephone surveys allow researchers to obtain a lot of information quickly; however, the question and topics covered must be fairly simple. Mail surveys allow consumer researchers to gather a lot of information with low cost. The major drawbacks of this approach are that it is time-consuming, the researcher can not control who responds, and the data may not representative to the target population. Internet surveys have the advantage of speed in completion, ease of data entry and low cost. The major disadvantage with internet survey is that the data may not be representative of the target population. Considering the complexity of the survey, time and funding budget, a mall intercept survey was finally adopted.

The mall intercept survey is an inexpensive method of data collection where the interviewer intercepts shoppers in a shopping mall or in the vicinity of the store (Churchill 1996). The advantage of mall intercepts is that researchers can ask consumers more complex questions, show product samples or different advertisements, and ask opinions. Yet, this method may be subject to interviewer bias, in which responses are influenced by the interviewer's characteristics (age, gender, etc.) or by a desire to please the interviewer (Blackwell et al., 2001, p.23). In this study, the interviewers intercepted consumers at wet market, supermarket or wholesaler, butcher, meat shop or the vicinity of the markets in Hangzhou and Shanghai, China. Consumers of "other" categories were

not visited and were not addressed in this study. The criterion for an individual shopper to be included in the sample was that he/she must be a consumer of meat.

The data was collected by the a team from Zhejiang University. In each city, Shanghai or Hangzhou, a team of two enumerators from Zhejiang University conducted the survey. All enumerators were undergraduates majoring in agribusiness and mature adults. They were trained before embarking on the survey. 168 respondents successfully complete the self-administered questionnaire in October and November, 1999 in Hangzhou, and 259 respondents in March and April, 2000 in Shanghai. A total of 427 meat consumers completed the survey.

4.7 Sample Representatives

It is always difficult to assess the representative of the sample to the population. Several important socio-economic and demographic variables from the survey were compared to the ones from yearbook from Hangzhou and Shanghai. To assess the representative-ness of the sample, the key social economic and demographic characteristics of the samples were compared with those from Zhejiang Statistical Yearbook 1998 and Shanghai Statistical Yearbook 2000 (Table 4-1 and 4-2). In both Hangzhou and Shanghai, the survey sample had a quite higher proportion of female than is the case for the population. This is somehow expected since female are more likely to be the main grocery shoppers in China. The household size of the sample in the two cities is slightly higher than that reported in the statistical yearbooks. The average household incomes are much higher than those obtained from the statistical yearbooks. In Hangzhou, old people were under-represented while young people were over-represented in this survey compared to the ratio obtained from the statistical yearbook of Zhejiang. In

Shanghai, old people were slightly over-represented while young people were under-represented in this survey. As such, our analysis below needs to be interpreted within the context of the data collected.

Table 4- 1. Comparison of Socio-economic and Demographic Characteristics from the Survey and those from Statistical Yearbook of Zhejiang Province, China.

Socio-economic and Demographic Characteristics	Survey Sample	Zhejiang Statistical Yearbook
Proportion of female respondents	68%	48%
Household size	3.83	3.19
Refrigerator possession per one hundred households	91%	97%
Monthly household income	3,600¥*	1,954 ¥
Age (64 years or younger)	99%	91%

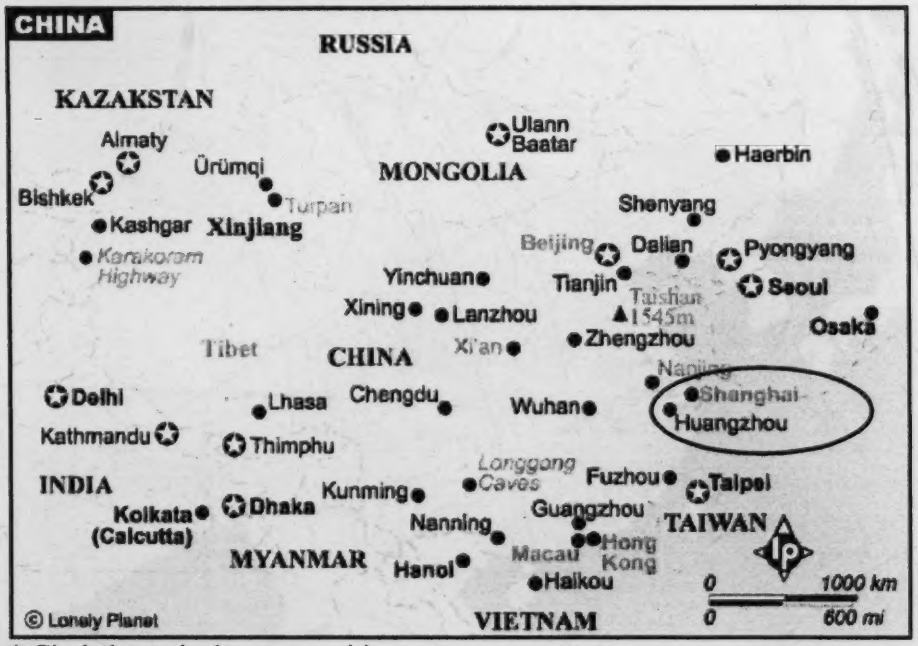
Source: Statistical Yearbook of Zhejiang (1998) and own survey

Table 4- 2. Comparison of Socio-economic and Demographic Characteristics from the Survey and those from Shanghai Statistical Yearbook, China.

Socio-economic and Demographic Characteristics	Survey Sample	Shanghai Statistical Yearbook
Proportion of female respondents	63%	49%
Household size	3.75	2.80
Refrigerator possession per one hundred households	96%	103%
Monthly household income	3,300¥	2,551¥
Age(64 years or younger)	86.87%	88.5%

Source: Statistical Yearbook of Shanghai (2000) and own survey.
*: Chinese currency, ¥8.276=US$1

Figure 4- 1: The Map of Survey Area



* Circled area is the survey cities.
Source: lonelyplanet.com

Chapter 5. Consumer Perceptions of Meat Attributes and Retail Outlets: Descriptive Analysis

5.1 What Meat Attribute Consumers Value Most

One of the objectives of this study was to investigate what meat attributes Chinese consumers value most. A variety of factors influence consumers' meat purchasing decisions, including meat attributes, differences in retail outlets, and socio-economic and demographic characteristics. As Melton et al. (1996a) stated, consumers value similar packages of fresh food differently based on subtle differences in the attributes of the food.

To obtain respondents' perceptions of fresh meat attributes in Shanghai and Hangzhou, a self-explication approach was applied. Respondents were asked to rate eighteen attributes of fresh meat on a 1-5 point scale, where 5 indicates the most important and 1 the least important attribute. The eighteen meat attributes were then grouped into 10 attributes. Respondents were asked to rank the 10 grouped attributes on a scale of 1 to10, where 1 is the least important and 10 the most important attribute. In marketing literature, the respondents' importance ranking is referred to as the part-worth of the attribute. Part-worths were obtained by multiplying the importance ranks of the 10 grouped attributes by the attribute-level importance ratings (Green and Srinivasan 1990, p9). The part-worth value can range from 1 to 50 in this research. Figure 5-1 presents the importance ranking of the eighteen fresh meat attributes for all respondents in Hangzhou and Shanghai. The higher the respondents value a specific attribute, the longer the bar.

Results revealed that the attribute *inspection stamps and certificates* was ranked as the most important, while *no chemical additive* was ranked as the second most

important. As both attributes are related to food safety aspects of fresh meat products, the results reflect the wide-spread concerns about food safety issues in China. *Freshness* was ranked the third most important.

Comparisons of the results from the present study with other similar studies are interesting. Table 5-1 shows the ranking results by consumers in Shanghai and Hangzhou in China, by consumers in Louisiana and Texas in the U. S., and by consumers of Asian-origin in California in the U. S. Chen et al. (2002) investigated Asian-origin customers' importance ranking of pork and found that Asian-origin customers ranked food safety attributes such as *pork free from chemicals* and *USDA label* as the sixth and seventh most important meat attributes respectively among thirteen meat attributes. Similarly, Hui et al. (1995) found that meat consumers in Louisiana and Texas ranked food safety attributes such as *USDA label* and *no chemical additives* as the fourth and fifth most important meat attributes respectively among twelve meat attributes.

Apparently, the results from the present study are not inconsistent with the results from the other two studies. Several reasons may contribute to the divergence in consumers' rankings of the food safety attributes. How countries perceive and handle food safety issues is generally based on access to and use of advances in science, detection technology, and mitigation methods. Wealthier countries with more information about food safety risks tend to demand more stringent food safety standards (Regmi and Gehlhar 2001). As compared to China, the U. S. may have more powerful and effective regulations on food safety. Additionally, several major food incidents and mass food-poisoning events have occurred in China, making food safety issues a nation-wide concern for consumers there. For example, according to a recent survey by China Daily

(2001), more than 90 percent of respondents reported that they did not feel confident about the safety of the food they consume daily. Based on these findings, meat processors and marketers emphasize food safety attributes to attract consumers.

There is another major difference between the present study and other studies. Both consumers of Asian-origin in California and consumers in Louisiana and Texas ranked *freshness* as the most important meat attribute. However, the respondents in Hangzhou and Shanghai ranked the *freshness* the third most important attribute of fresh meat. The difference is because the Chinese consumers placed overwhelming importance on *inspection stamps and certificates* and *no chemical additives*. *Freshness* then became the third most important meat attribute.

The remaining attributes were ranked as follows: smell (4^{th}), cleanliness (5^{th}), color of meat (6^{th}), tenderness (7^{th}), flavor (8^{th}), price (9^{th}), whiteness of fat (10^{th}), low in fat (11^{th}), and leanness (12^{th}).

Respondents ranked the price as the ninth most important meat attribute, right after the attributes related to food safety and appearance. Price was perceived more important than the attributes related to nutrition and convenience. The comparative high rank for price is expected. The finding is consistent with the results reported by Lo et al. (2002), who found that Chinese consumers were perceived to be price sensitive, tending to visit different stores and to compare the prices before making purchase decisions.

Nevertheless, supermarkets, which emphasize packaging and food readiness, have developed quickly in China. Attributes such as *proper packaging*, *origin*, *purchase convenience*, *meat cut to specifications, variety in cuts and forms*, and *seasoned and ready-to-cook meat* received the lowest ranks. The fact is that 86% of respondents in the

survey purchased most of their meat products from non-supermarket retail outlets, such as wet markets, wholesalers, meat shops, or other shops. Meat products sold in non-supermarket retail outlets are typically sold without proper packaging, brand or labels. This might explain why these attributes had comparatively low ranks.

Proper packaging, country of origin, purchase convenience, meat cut to specifications, variety in cuts and forms, and seasoned and ready-to-cook meat were not considered as the most important attributes by respondents. Looking back to Table 5-1, Asian-origin consumers in the U.S. also valued food convenience attributes such as variety in cuts, seasoned and ready-to-cook, and meat cut to your specifications as the least important attributes (Table 5-1). However, there are no food convenience attributes in Hui's et al.'s study. From this perspective, it is not surprising that Chinese consumers value these food convenience attributes as the least important. After all, the *food safety* attributes and *freshness* may be more related to "true quality," while *convenience* attributes are more related to external "convenience."

It should be noted that perceptions may change as more packaged products enter the market and competition continues to intensify. Proper packaging is a highly effective tool for educating consumers and influencing sales. Meat products which are seasoned and ready-to-cook, and which provide customized cuts, present new choices. Therefore, it is not surprising to learn that supermarkets in China are developing packaging that emphasizes the convenience of the meat products, focusing on attributes such as proper packaging, purchase convenience, meat cut to specifications, variety in cuts and forms, and seasoned and ready-to-cook meat.

As *country of origin* is not considered an important attribute by participants, emphasizing *country of origin* may not be an efficient strategy to influence consumers' purchasing decisions. As the survey revealed, only ten percent of respondents have ever purchased imported meat. The low rank for country of origin may be due to the Chinese government's policy of meat self-sufficiency. Another reason is that China's meat market has not yet opened up.

5.1.2 Importance Ranks for the Meat Attributes (Hangzhou vs. Shanghai)

It was assumed that regional differences may exist between Hangzhou and Shanghai in terms of importance ranking for meat attributes. Table 5-2 shows the importance rankings for Hangzhou and Shanghai respondents respectively. Overall, they gave rather similar rankings to the eighteen meat attributes, with one exception. Respondents from Hangzhou ranked *freshness* ahead of *no chemical additives* and *inspection stamps* and *certificates*.

5.2 Do Consumers Differentiate All Meat Attributes

To determine whether or not respondents significantly differentiated the eighteen meat attributes, a non-parametric Kruskal-Wallis test (Berenson and Levine 1996, p.545) was applied. The Kruskal-Wallis test is used to compare three or more independent groups of sample data. The Kruskal-Wallis test is typically applied when the assumption of normality is not met. As with many non-parametric tests, the Kruskal-Wallis test uses the ranks of the data rather than their raw values to calculate the statistics. The formula of the Kruskal-Wallis statistic is:

$$H = \left[\frac{12}{n(n+1)} \sum_{j=1}^{k} \frac{R_j^2}{n_j} \right] - 3(n+1) \qquad (5\text{-}1)$$

where H can be approximated by the chi-square distribution; k is the number of samples; n is the total number of observations; n_j is the number of observations in the j^{th} sample, j = 1, 2, …., 18; R_j is the sum of the ranks assigned to the j^{th} sample; and R_j^2 is the square of the sum of the ranks assigned to the j^{th} sample. The null hypothesis of the test is that the importance rankings of the different attributes are equal. When calculated H exceeds the critical value χ^2 at 5 percent level of significance with j-1 degree of freedom, the null hypothesis is rejected. This indicates that respondents rank the selected meat attributes differently, if not all.

The Kruskal-Wallis test was conducted using the SPSS 11.0 statistical software package. H was calculated at 3110.52, with a critical Chi-square value of 33.4 at a 1 percent level of significance with 17 degrees of freedom. The null hypothesis that the importance rankings of the different attributes are equal is rejected. This indicates that respondents differentiate at least some of the eighteen meat attributes.

5.3 Where the Consumers Purchase Fresh Meat

The participants were asked to indicate where they purchased most of their fresh meat. Possible retail outlets included butcher shops, supermarkets, wet markets, wholesalers, meat shops, and other shops. A total of 372 respondents answered the question. Figure 5-2 presents the retail outlet choices made by the respondents in Hangzhou and Shanghai. Seventy-six percent of the respondents purchased most of their fresh meat from wet markets, fourteen percent from supermarkets, eight percent from wholesalers, one percent from meat shops, and one percent from other shops. No respondents chose butcher shop as their most frequent retail outlet.

The survey results indicate that wet markets are the most popular places for Chinese to purchase meat products. However, as a new emerging retail power, the supermarket is beginning to attract more and more customers. It was the second most frequently visited retail outlet for Shanghai and Hangzhou shoppers. Wholesale markets were the third most popular retail outlet. Usually, wholesalers do both wholesale and retail business in China. Prices of goods offered by wholesalers are comparatively cheaper than those of supermarkets and wet markets. The low prices offered by wholesalers may be one of the reasons why wholesale markets were the third most popular retail outlet. Meat shops and other markets had a fairly small market share. Interestingly, no respondents chose small butchers. This may be because a lot of small butchers put their stalls in the wet markets. The difference between small butchers and wet markets is not clear-cut. Actually, some respondents buy meat from butchers at wet markets.

There are some regional differences between respondents from Hangzhou and Shanghai in terms of choices of retail outlets. As reflected by Table 5-3, seventeen percent of respondents purchased most of their meat products from supermarkets in Shanghai, while only eight percent did so in Hangzhou. The difference might result from the fact that market reforms were introduced in Shanghai earlier than in Hangzhou. Over the past several years, Shanghai has brought about large-scale structural changes in the retailing sector. According to a report by the Canadian General Consulate (2000), Shanghainese were quick to accept changes in the way they shop. Food shopping is increasingly done in supermarkets that offer shoppers added convenience, product selection and improved sanitation. Compared to Hangzhou and the rest of China in terms

of supermarket development, Shanghai is far ahead in its number of supermarkets, and turnover of total sales.

Accordingly, more respondents in Hangzhou purchased meat products from wet markets than those in Shanghai (87% vs. 70%). Ten percent of respondents in Shanghai purchased meat products from wholesalers, compared to only four percent of the respondents in Hangzhou. One finding common to both cities was that the percentages of respondents purchasing meat products from meat shops or other shops were quite low, reflecting declined importance of meat shops in China.

5.4 Consumers' Perceptions of the Attribute of Retail Outlets

To understand why respondents purchase fresh meat at particular types of retail outlets, respondents were asked to indicate their perceptions of various attributes of five retail outlets. They were asked to evaluate seven attributes of retail outlets using a Likert scale from 1 to 5, with 1 being the lowest level of an attribute and 5 being the highest. However, not all respondents rated the attributes for all of the retail outlets because not all respondents were familiar with all types of retail outlets and some of the retail outlets may not have been in their choice set. Wet markets, supermarkets and wholesalers were chosen for the analysis. Table 5-4 summarizes the mean ranking of the seven attributes for the three types of retail outlets both by tabulating the Hangzhou respondents and Shanghai respondents separately and by combining the Hangzhou respondents and Shanghai respondents.

The *overall meat price* asked by supermarkets was perceived to be the highest with that of wet markets second, and wholesalers being seen offering the lowest prices. The *meat quality* offered by supermarkets was perceived to be the best, followed by that

of wet markets and that of wholesalers. Respondents' ranks for *store location, customer service, shopping environment* and *meat certificate* followed the same pattern. Supermarkets received the highest ranking, followed by wet markets and wholesalers. However, *meat selection* is an exception. Wholesalers offered the greatest selection of meat products, followed by wet markets, while supermarkets offered the least selection of meat products.

Perceptions of the store attributes differed between the two cities. Like Shanghai respondents, when evaluating *meat price, meat quality, customer service, shopping environment,* and *meat certificate*, Hagnzhou respondents gave higher rankings to supermarkets and lower rankings to wet markets. However, the ranking gaps between supermarkets and wet markets perceived by Hangzhou respondents are larger than those by Shanghai respondents. For example, Hangzhou respondents rated *meat price* at supermarkets 3.8 and 2.5 for wet markets, a difference of 1.3. Shanghai respondents rated the same attribute for supermarkets 3.6 and 2.7 for wet markets, a difference of 0.9. The pattern is the same for *meat quality, customer service, shopping environment,* and *meat certificate.*

With respect to *store location,* Shanghai respondents rated the *store location* of supermarkets higher than that of the wet markets. In contrast, respondents in Hangzhou thought the *store location*s of wet markets were better than those of supermarkets.

A possible reason behind these differences by city might be that Shanghai has a more mature supermarket system, and the Shanghai government has put more effort into improving wet markets. The retail systems in Shanghai are undergoing a more in-depth reform than those in Hangzhou.

5.5 Characteristics of the Respondents

Table 5-5 summarizes socio-economic and demographic characteristics of the survey data. The sample consisted of 180 males and 232 females. Seventy four percent of respondents were married, with the average number of dependent children being 1.03, and average household size 3.73. Respondents' average monthly income fell in the category of ¥2000-¥3000. Ninety-nine percent of respondents were of the Han ethnic group, and ninety-eight percent of their spouses were also Han.

Forty-six percent of respondents liked to shop for groceries in the morning; seventeen percent of respondents liked to purchase them during the day; thirty-seven percent of respondents liked to purchase them after work. Sixty-two percent of respondents were main meal makers. Thirty percent of respondents purchased meat every day; sixty-two percent of respondents purchased meat three times or more but not every day; and eight percent of respondents purchased meat twice a week. Seventy-nine percent of the respondents preferred meat products from home-raised animals or birds. Ninety-four percent of respondents had refrigerators; and seventy percent of respondents had microwave ovens.

Figure 5- 1. Importance Ranks for Eighteen Fresh Meat Attributes in Hangzhou and Shanghai, China, 2000

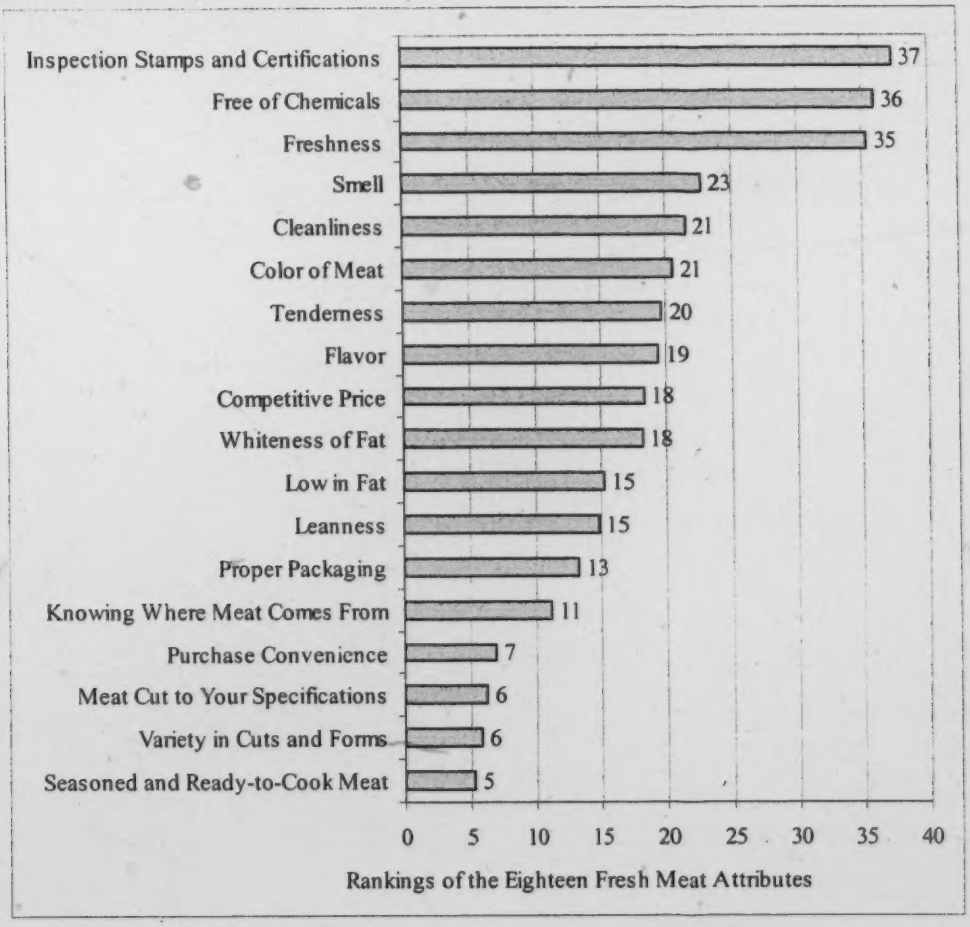


Table 5- 1. Selected Meat Attribute Ranks by Similar Studies

Present Study		Chen et al. (2002)		Hui et al. (1995)	
Meat Attributes	Comparative Rank	Fresh Pork Attribute	Comparative Rank	Meat Attributes	Comparative Rank
Inspection stamps and certifications	1*	Freshness	1	Freshness of meat	1
Free of chemical	2	Color of meat	2	Taste of meat	2
Freshness	3	Low in fat	3	Appearance of meat	3
Smell	4	Whiteness of fat	4	USDA label	4
Cleanliness	5	Price of pork	5	No chemical additives	5
Color of meat	6	Pork free from chemicals	6	Tenderness of meat	6
Tenderness	7	USDA label	7	Low in fat	7
Flavor	8	Knowing that pork comes from the USA	8	Low in sodium	8
Competitive price	9	Customized pork cuts	9	Low in cholesterol	9
Whiteness of fat	10	Cut and packaged pork	10	White meat	10
Low in fat	11	Vacuum packed pork	11	Red meat	11
Leanness	12	Seasoned and prepared pork	12		
Proper packaging	13				
Knowing where meat comes from	14				
Purchase convenience	15				
Meat cuts to your specifications	16				
Variety in cuts and forms	17				
Seasoned and ready-to-cook meat	18				

*. 1 stands for the most important meat attribute, while 18 stands for the least important meat attribute.

Table 5- 2. Importance Ranks for Eighteen Attributes of Fresh Meat (Hangzhou vs. Shanghai), China, 2000

Shanghai		Hangzhou	
Meat Attributes	Raw Rank	Meat Attributes	Raw Rank
No Chemical Additives	39	Freshness	37
Inspection Stamps and Certifications	39	Inspection Stamps and Certifications	35
Freshness	34	No Chemical Additives	32
Smell	24	Smell	21
Cleanliness	22	Competitive Price	20
Color of Meat	22	Flavor	20
Tenderness	20	Cleanliness	20
Whiteness of Fat	20	Tenderness	20
Flavor	19	Color of Meat	18
Competitive Price	17	Healthiness (Low in Fat)	17
Proper Packaging	15	Leanness	17
Healthiness (Low in Fat)	14	Whiteness of Fat	16
Leanness	14	Proper Packaging	11
Knowing Where Meat Comes From	13	Purchase Convenience	8
Purchase Convenience	6	Knowing Where Meat Comes From	8
Meat Cuts to Your Specifications	5	Meat Cuts to Your Specifications	8
Variety in Cuts and Forms	5	Variety in Cuts and Forms	7
Seasoned and Ready-to-Cook Meat	5	Seasoned and Ready-to-Cook Meat	6

Figure 5- 2. Percentage of Respondents and Their Choice of retail outlets in Hangzhou and Shanghai, China, 2000

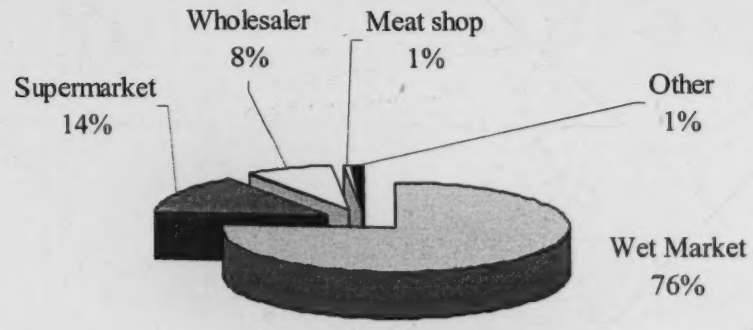


Table 5- 3. Respondents' Choices of Retail Outlets in Hangzhou and Shanghai, Respectively, 2000

Retail Outlets	Hangzhou	Shanghai
Wet Market	87%	70%
Supermarket	8%	17%
Wholesaler	4%	10%
Meat shop	1%	0%
Other	0%	2%

Note: Total percentages may not add up to 100 due to rounding.

Table 5- 4. Mean Ratings for Store Attributes of Retail Outlets in Hangzhou and Shanghai, 2000

Attributes	Measurement	Hangzhou and Shanghai	Hangzhou	Shanghai
Meat Price				
Supermarket	1-inexpensive,	3.6	3.8	3.6
Wet Market	5- expensive	2.6	2.5	2.7
Wholesaler		2.4	2.5	2.3
Meat Quality				
Supermarket	1-poor, 5- excellent	3.7	3.9	3.7
Wet Market		3.0	3.1	3.0
Wholesaler		2.7	2.8	2.7
Store Location				
Supermarket	1-not convenient, 5- convenient	3.6	3.4	3.7
Wet Market		3.4	3.6	3.2
Wholesaler		2.1	2.0	2.1
Customer service				
Supermarket	1-poor, 5-good	3.8	3.8	3.7
Wet Market		3.4	3.3	3.5
Wholesaler		2.9	2.9	2.9
Shopping Environment				
Supermarket	1-poor, 5- good	4.1	4.2	4.1
Wet Market		3.0	2.8	3.2
Wholesaler		2.6	2.7	2.6
Meat Certificate				
Supermarket	1-less faith, 5- more faith	4.0	4.0	4.0
Wet Market		3.1	3.1	3.2
Wholesaler		2.7	2.8	2.6
Meat Selection				
Supermarket	1-poor, 5-good	3.8	3.3	4.0
Wet Market		4.0	3.6	4.2
Wholesaler		3.8	3.5	4.0

Table 5- 5. Socio-economic and Demographic Variables, Definitions, Codes and Statistics for the Survey Data

Socio-economic and Demographic Variables	Definition	Mean	Standard Deviation
Gender	Male=1, Female=0	0.44	0.5
Morning purchase	Purchase in morning =1, otherwise =0	0.46	0.5
Noon purchase	Purchase at noon =1, otherwise=0	0.17	0.38
After work purchase	Purchase after working =1, otherwise =0	0.37	0.48
Purchase frequency	Purchase everyday =1, otherwise=0	0.07	0.26
Preference	Prefer home raised animal=1, otherwise=0	0.79	0.41
Import meat	Having purchased imported meat =1, otherwise =0	0.11	0.31
Married	Married=1, Single=0	0.73	0.44
Refrigerator	Owing a refrigerator =1, otherwise = 0	0.94	0.24
Microwave	Owing a microwave oven = 1, otherwise =0	0.7	0.46
Household size	Number of members in a household (1 – 8)	3.73	1.23
Low income	Below ¥2,000/month =1, otherwise=0	0.33	0.47
Middle income	Between ¥2,000-6,000/month=1, otherwise=0	0.60	0.49
High income	Higher ¥6,000/month=1, otherwise=0	0.07	0.25
Age1	Under 35=1, otherwise=0	0.47	0.5
Age2	Between 35-55=1, otherwise=0	0.43	0.49
Age3	Over 55, otherwise=0	0.10	0.3
Low education	Elementary and high school = 1, otherwise=0	0.26	0.44
Middle education	Technical school and College = 1, otherwise=0	0.46	0.50
High education	University =1, otherwise=0	0.28	0.45
Shanghai	Respondent who live in Shanghai=1, Hangzhou=0	0.61	0.49

Chapter 6. Consumers' Perceptions of Fresh Meat Attributes: Factor and Regression Analysis

6.1 Introduction

In Chapter Five, consumers in Shanghai and Hangzhou were found to value most of the eighteen meat attributes differently. But not every attribute was necessarily found to be valued differently from each other. Those attributes which were not valued differently by consumers could be grouped together. Therefore, factor analysis was applied to re-categorize the eighteen meat attributes into a smaller number of categories. OLS regression analysis was applied to identify the relationships between respondents' perceptions of attributes and their socio-economic and demographic characteristics.

6.2 Grouping Various Meat Attributes: Factor Analysis

The present study included a large set of meat attributes. Large attribute sets often include highly correlated, bundled attributes (Pendleton and Shonkwiler 2001). If attributes are technically bundled, then analyses that treat the attributes as independent may be incorrect. Factor analysis can be used to extract latent factors from the large set of attributes (Pendleton and Shonkwiler 2001).

Factor analysis is a multivariate statistical approach that is used to analyze inter-relationships among a large number of attributes and to explain these attributes in terms of their common underlying dimensions or factors. This approach provides a way of condensing the information contained in a number of original attributes into a smaller set of dimensions (factors) with a minimum loss of information. The essential purpose of

factor analysis is to describe the variation among many variables in terms of a few underlying but unobservable random variables called factors (Jobson 1992, p388).

The objective of factor analysis is to generate a first factor that explains the maximum variance. With the first factor and its associated loading fixed, factor analysis will locate a second factor that maximizes the variances it explains. The procedure continues until there are as many factors generated as there are variables (Aaker et al. 1998). Factor analysis can also be viewed as a statistical procedure for grouping variables into subsets such that the variables within each set are mutually highly correlated, whereas at the same time variables in different subsets are relatively un-correlated. As indicated by the Kruskal-Wallis test in previous chapter, respondents from Hangzhou and Shanghai differentiated some of the meat attributes but not others. Factor analysis was applied to re-group the eighteen meat attributes into a few latent attributes.

The relationship between fresh meat attributes y, and the latent factor attributes F can be modeled in the following factor analytic model (Jobson 1992):

$$y = \lambda F + \varepsilon \tag{6-1}$$

where y is an (nx1) vector of standardized variables of the eighteen meat attributes, λ is an (nxm) matrix of factor coefficients (it is also called factor loadings); m<n. F is an (mx1) vector of unobserved factors; and ε is an (nx1) error vector and is distributed independently of F.

As well, the factor scores were estimated and used for the second stage analysis. For respondent k, the score for the j th factor is estimated as (SPSS 1999):

$$F_{jk} = \sum_{i=1}^{p} \varpi_{ji} y_{ik} \tag{6-2}$$

where y_{ik} is the standardized value of the i^{th} observed attribute (e.g., *price, freshness, cleanliness and low in fat*) for case/respondent k; ϖ_{ji} is the factor score coefficient for the j^{th} factor and the i^{th} variable; and F_{jk} is the factor score for case k for j^{th} factor. These factor scores were utilized as repressors in the OLS regression discussed below.

An important strength of the factor analytic approach is that it identifies the underlying constructs in the data and reduces a large set of variables to a more manageable smaller set. The greatest limitation of factor analysis is that it is a highly subjective process (Aaker et al. 1998). The determination of the number of factors, their interpretation, and the rotation all involve subjective judgment. The other limitation is that no statistical tests are regularly employed in factor analysis. As a result, it is difficult to know whether the results are merely accidental or really reflect something meaningful.

6.2.1. Results of the Factor Analysis

The factor analysis was conducted by using SPSS 11.0 statistical software. The principal components method and varimax[3] rotation were used to reduce the eighteen variables to six factors having eigenvalues greater than 1.0. Table 6-1 presents the factor loading matrix for the entire sample. The table shows the loading of each attribute on the six factors identified in the factor analysis. For the purpose of interpretation, each factor is composed of variables that loaded 0.30 or higher on that factor (SPSS 11.0). Factor loadings are the basis for imputing a label to the different factors. The factors loadings are the correlation coefficients between the variables and factors. A higher factor loading indicates that the attribute is highly associated with that factor. A factor's eigenvalue may be computed as the sum of its squared factor loadings for all the variables. A factor's

[3] The Varimax (variance maximizing) method: the method attempts to minimize the number of variables that have high loadings on a factor (but maximizes the variance accounted for).

eigenvalue divided by the number of variables is the percent of variance in all the variables which it explains (SPSS 11.0). The six factors explained 75% of the total variance for the sample data. The factors one to six explained 19%, 17%, 11%, 11%, 9% and 7% of the sample variance respectively.

Factor 1 represents the latent attribute - *convenience*, which is comprised of the *meat cut to your specification, purchase convenience, variety in cuts and forms,* and *seasoned and ready-to-cook meat* attributes. Factor 2 represents the latent attribute – *appearance*, which includes *cleanliness, colour of meat, whiteness of fat* and *proper packaging*. Factor 3 represents the latent attribute – *nutrition*, which consists of *leanness* and *low in fat*. Factor 4 represents the latent attribute - *safety*, which consists of *inspection stamps and certifications,* and *no chemical additives*. Factor 5 represents the latent attribute – *taste*, including *freshness, smell, origin, tenderness* and *flavour*. Factor 6 represents the latent attribute - *price*. In sum, the six latent attributes generated using the factor analysis method are *convenience, appearance, nutrition, safety, taste*, and *price.*

Based on the six factors generated from factor analysis, the raw rank data for the eighteen meat attributes were used to calculate a comparative average rank for each factor. The average ranks for the six factors are presented in Figure 6-1. *Safety* had the highest average rank, while *convenience* had the lowest average rank. These results are consistent with the importance rankings for the eighteen meat attributes in Chapter 5.

6.3 Consumers' Perceptions of the Latent Meat Attributes

6.3.1 OLS Model Specification

One of the objectives of this study was to investigate the determinants of fresh meat attributes. The OLS regression analysis was used to achieve this objective. As in

much of the recent empirical literature on product characteristics, we focused on a model in which products are defined as vectors of characteristics. The consumers' choice process can be expressed as a procedure that the consumer chooses among the various attribute bundles to maximize utility (i.e., equation 4-5), and it is hypothesized that these are determined by a vector (w) of the consumer's socioeconomic and demographic factors. The utility function (F) is not observable, but is assumed to reflect the observed vector of rating R. The vector R is comprised of the responses of each survey participant, and this is expressed as an ordinal rating based on his/her individual utility function. In this study, the observed ratings are substituted by factor scores, which are distributed with zero mean and a variance of one. For a detailed theoretical framework of the OLS, along with the Lancasterian conceptual model, please refer to Chapter 4.

The dependent variables for the regression model are the six latent attributes from the factor analysis. The scores of the six factors, as shown in Table 6-3, were standardized with a mean of zero and a variance of one. The larger a value, the higher the rating assigned to a specific variable. Each factor score estimate is a numerical value that indicates an individual respondent's relative spacing or standing on a latent factor. Within a factor, the larger the value, the higher the rating assigned to a specific variable. For example, within the convenience attribute, the relative rating of -0.350 is higher than that of -0.613.

The OLS regression model for the six latent attributes can be specified as follows:

$$F_{jk} = \beta w + \varepsilon_j \quad (j=1, \ldots, 6) \tag{6-6}$$

where F is a vector of factor scores of the latent attributes, j is *convenience, appearance, nutrition, safety, taste,* and *price* for the k-th respondent; β s are parameters to be estimated; w is a vector of socio-economic and demographic characteristics; and ε_j is a vector of the error term.

Table 6-4 presents definitions and descriptive statistics concerning the socio-economic and demographic characteristics. All the explanatory variables with the exception of household size are dummy variables. The variable household size is a numeric variable ranging from 1 to 8 or more. The variables age, income, and education were each grouped into three categories. Age was categorized into three groups, Age1, Age2, and Age3. Income was also grouped into low income, middle income, and high income. Similarly, education was classified into low education, middle education, and high education. AGE3, LINCOME, EDULOW were dropped to avoid the problem of singularity.

6.3.2 OLS Estimation Results

Several regression models with different specifications of the independent variables were analyzed. Multi-collinearity problems were suspected for several explanatory variables. Therefore, correlation analyses were conducted for the independent variables. The variable MARRIED was correlated with the variable SHOPPER at 0.414. MARRID was dropped from the OLS regression. Similarly, the variables COOK and SHOPPER were correlated at 0.814, and the variable COOK was excluded from further analysis. *GRAND* and *HSIZE* were correlated at 0.408. *HSIZE* was excluded to avoid the problem of collinearity.

Some variables were dropped because of lack of variation. With respect to NATN, 98.5 percent of the respondents were of Han nationality, and 97.8 percent of their spouses were Han. *NATION* and *SNATN* were excluded due to the lack of variation in the data. The variable REFRIDGE was excluded due to the lack of variation. Approximately 94.2% of the respondents have refrigerators.

Further, after the initial analyses, the variables *CHILD1*, *JOB*, AGE1, AGE2, and AGE3 were excluded from the analyses as these variables were not significant in all models.

The regression model was estimated using the econometric software LIMDEP Version 7.0 (Greene 1997). The regression model was run to determine the relationship between the six latent attributes and the socio-economic and demographic characteristics. The dependent variables for the six equations were *convenience*, *appearance*, *nutrition*, *safety*, *taste* and *price*. The estimation results from the regression model are given in Table 6-5. The adjusted R^2 values were low for each equation, ranging from 0.061 for the appearance attribute equation to 0.145 for the appearance attribute equation. This is expected because the adjusted R^2 is commonly low for cross-sectional data (Bereson and Levine 1996).

Convenience attribute

The estimated coefficients of GENDER, IMPORT, SUPERMARKET, SHANGHAI and MINCOME were statistically significant for the equation of convenience. The estimated coefficient of GENDER was positive and significant at a 10 percent level of significance. This suggests that male respondents value the convenience attribute higher than female respondents, holding other factors constant. The estimated

coefficient of IMPORT was positive and significant at a 1 percent level of significance for the equation of convenience. This suggests that respondents who have purchased imported meat recently value convenience attributes higher. The estimated coefficient of SUPERMARKET was positive and significant at a 1 percent level of significance, indicating that respondents who shop at supermarkets value the convenience attribute higher than those who shop at wet markets. This sign is expected for in general, supermarkets emphasize on the convenience, package attributes of products as compare to wet markets. The estimated coefficient of SHANGHAI was negative and significant at a 10 percent level of significance, suggesting that Shanghai respondents, as opposed to those from Hangzhou, value the convenience attribute less. The estimated coefficient of MINCOME was positive and significant at a 1 percent level of significance, implying that respondents who are in the middle income group value the convenience attribute higher than those in the low income group. However, HINCOME was not significant at the model. It may be related to the popular phenomena – maid phenomena - in China. It is affordable for high-income respondents to have "maid" in China. Employing a maid to do the housework is a quite often in China and the salary for a maid is low.

Appearance attribute

The estimated coefficients of WHOLESALER, SHANGHAI, EDUMED, and EDUHIGH were statistically significant for the equation of appearance. The estimated coefficient of WHOLESALER was negative and significant at a 1 percent level of significance. This may suggest that respondents who purchase meat from wholesalers value the appearance attribute lower than those who purchase from wet markets. The estimated coefficient of SHANGHAI was positive and significant at a 1 percent level of

significance. This may indicate that Shanghai respondents value the appearance attribute higher than Hangzhou respondents. The estimated coefficient of EDUMED was negative and significant at a 5 percent level of significance, indicating that respondents who have middle educations value the appearance attribute higher than those who have low educations. The estimated coefficient of EDUHIGH was negative and significant at a 5 percent level of significance. This may suggest that respondents who have higher educations value the convenience attribute less as compared to who have low educations.

Nutrition Attributes

The estimated coefficients of MPURCHASE, SUPERMARKET, WHOLESALER, SHANGHAI and MICROWAVE were statistically significant for the equation for the nutrition attribute. The estimated coefficient of MPURCHASE was positive and significant at a 1 percent level of significance. This may suggest that, as compared to respondents who purchase meat in the afternoon or after work, morning purchasers care more about nutrition. The estimated coefficient of WHOLESALER was negative and significant at a 5 percent level of significance. This may suggest that, as compared to respondents who purchase meat from supermarkets or wet markets, respondents who purchase meat from wholesalers care less about nutrition. The estimated coefficient of SHANGHAI was negative and significant at a 1 percent level of significance, possibly showing that Shanghai respondent, as apposed to Hangzhou respondents, gave higher scores to the nutrition attribute. The estimated coefficient of MICROWAVE was positive and significant at a 5 percent level of significance. This may indicate that respondents who have microwave ovens value nutrition higher as compared to other respondents.

Safety attributes

The estimated coefficients of GENDER, SHOPPER, HOMERAISE, SHANGHAI and MICROWAVE were statistically significant for the equation of safety. The estimated coefficient of GENDER was negative and significant at a 5 percent level of significance, suggesting that male respondents value safety less as compared to female respondents. The estimated coefficient of SHOPPER was positive and significant at a 1 percent level of significance. This may show that respondents who are grocery shoppers value the appearance attribute higher. The estimated coefficient of HOMERAISE was positive and significant at a 1 percent level of significance. This indicates that respondents who like meat from home raised animals value the safety attribute higher. The estimated coefficient of SHANGHAI was positive and significant at a 1 percent level of significance. This suggests that Shanghai respondents value safety attributes higher than Hangzhou respondents. The estimated coefficient of HINCOME was positive and significant at a 10 percent level of significance, suggesting that respondents who have high incomes value safety higher as compared to those who have low incomes. The estimated coefficient of EDUMED was positive and significant at a 10 percent level of significance, indicating that respondents who have middle educations value safety higher than those who have low educations.

Taste attribute

The estimated coefficients of GENDER, MPURCHASE, FRQSHOP and HOMERAISE were statistically significant for the equation of taste. The estimated coefficient GENDER was negative and significant at a 5 percent level of significance. This may also suggest that, as compared to the female respondents, male respondents

care less about taste. The estimated coefficient of MPURCHASE was positive and significant at a 5 percent level of significance. This shows that morning purchasers give higher scores for the taste attribute. The estimated coefficient of FREQSHOP was positive and significant at a 1 percent level of significance, possibly showing that everyday shoppers gave higher scores for the taste attribute. The estimated coefficient of HOMERAISE was positive and significant at a 1 percent level of significance. This indicates that respondents who like meat from home-raised animals value taste higher. The estimated coefficient of MICROWAVE was negative and significant at a 1 percent level of significance. This suggests that respondents who have microwave ovens value taste less than those who do not. The estimated coefficient of GRANDPARENTS was negative and significant at a 1 percent level of significance. This may suggest that respondents who live together with their grandparents value taste less.

Price attribute

The estimated coefficients of MPURCHASE, HOMERAISE, IMPORT, SUPERMARKET, WHOLESALER, SHANGHAI and MICROWAVE were significant for the equation of price attribute. The estimated coefficient of MPURCHASE was negative and significant at a 10 percent level of significance. This may show that morning purchasers gave higher scores for the price attribute. The estimated coefficient of HOMERAISE was negative and significant at a 1 percent level of significance. This suggests that respondents who like meat from home-raised animals value the price higher. The estimated coefficient of IMPORT was positive and significant at a 1 percent level of significance, indicating that respondents who have purchased imported meat recently value the price attribute higher. The estimated coefficient of SUPERMARKET

was negative and significant at a 5 percent level of significance. This suggests that respondents who purchase meat from supermarkets value the price attribute higher than those who shop at wet markets. The estimated coefficient of WHOLESALER was negative and significant at a 1 percent level of significance. This may suggest that respondents who purchase meat from wholesalers value the price attribute less. The estimated coefficient of SHANGHAI was negative and significant at a 5 percent level of significance. This may suggest that SHANGHAI respondents rank the price attribute lower. The estimated coefficient of MICROWAVE was negative and significant at a 1 percent level of significance. This suggests that respondents who have microwave oven value the price attribute less.

6.4 Summary

The interpretation of the estimation results can be explained across the equations. The results from this study shows that the estimated coefficient of GENDER have a significant positive effect for the equation of convenience attribute and has a negative significant effect for the equations of safety and taste attributes. Nevertheless, estimated coefficient of GENDER has no effect for the equations of appearance, nutrition, and price attributes. This may suggest that as compared to the female counterpart male respondent cares more about *convenience*, but care less about *food safety* and *taste attributes*.

The estimated coefficient of SHOPPER has a significant positive effect for the equation of safety attribute, while has no effect for the other equations. This may indicate that a respondent who is the major grocery shopper values *food safety* attributes higher than those who are not.

The estimate coefficient of MPURCHASE have positive significant effect for the equations of nutrition and taste attributes, while it affects the price negatively. This may suggest that a respondent who likes to purchase in the morning cares more about meat nutrition and taste attributes, has less concern about the price of meat than respondent who likes to purchase late in the day.

The estimated coefficient of FREQSHOP has positive significant effect for the equation of taste attribute. This may suggest that a respondent purchase meat everyday cares more about taste.

The estimated coefficient of HOMERAISE have positive and significant effect for the equations of safety and taste attributes, while has a negative and significant effect for the equation of price attribute. This may suggest that respondents who like meat of home raised animal care more about safety and taste, and care less about price.

The estimated coefficient of IMPORT have positive and significant effect for the equation of convenience and price attributes. This may suggest that respondent who purchases imported meat recently care more about convenience and price.

The estimated coefficient of SUPERMARKET have positive and significant effect for the equations of convenience and nutrition attributes, while has negative effect on price. This may suggest that respondent who purchase meat from supermarket care more about convenience and nutrition, and care less about price.

The estimated coefficient of WHOLESALER have negative significant effects for the equations of appearance, nutrition and price attributes. This may suggest that

respondents who purchase meat from wholesaler care less about appearance, nutrition and price.

The estimated coefficient of SHANGHIA have positive significant effect on for the equation of appearance and safety, while have negative significant effect for the equation of nutrition and price. This may suggest that Shanghai respondents care more about appearance and safety, while care less about nutrition and price.

The estimated coefficient of HINCOME has positive and significant effect for the equation of safety. This may suggest that respondents who have high incomes care more about safety.

The estimated coefficient of MINCOME has positive and significant effect for the equation of convenience. This may suggest that respondents who have middle incomes care more about convenience.

The estimated coefficient of MICROWAVE has positive and significant effect for the equation of nutrition, while have negative and significant effect for the equation of taste and price. This may suggest that respondents who have microwave ovens care more about nutrition, and care less about taste and price.

The estimated coefficient of GRANDPARENTS has negative and significant effect for the equation of taste. This may suggest that respondents who live together with grandparents care less about taste.

The estimated coefficient of EDUMED has negative and significant effect for the equation of appearance, while has positive and significant effect for the equation of safety. This may suggest that respondents who have middle educations care less about appearance, while care more about safety.

The estimated coefficient of EDUHIGH has negative and significant effect for the equation of appearance. This may suggest that respondents who have high educations care less about appearance.

Table 6- 1. Rotated Component Matrix for the Eighteen Attributes of Fresh Meat

Observed Meat attributes	Factor Groupings (latent attributes)					
	Convenience	Appearance	Nutrition	Safety	Taste	Price
Meat Cuts to Your Specifications	0.909			-0.102		
Purchase Convenience	0.888					
Variety in Cuts and Forms	0.834			-0.172		
Seasoned and Ready-to-Cook Meat	0.829			-0.165		
Cleanliness		0.920				
Color of Meat		0.897				
Whiteness of Fat		0.839			-	
					0.157	
Proper Packaging		0.666			-	
					0.187	
Leanness			0.943		0.107	
Low in Fat			0.892		0.105	
Inspection Stamp and Certifications	-0.199			0.847		
No Chemical Additives	-0.246		-0.100	0.714	.154	
Freshness	-0.158	0.154		0.360	0.520	0.148
Smell					0.483	-0.294
Origin		-0.142	-0.203	-0.200	-	-0.418
					0.477	
Tenderness		-0.151			0.410	
Flavor		-0.162			0.301	
Competitive Price						0.830
Eigenvalues	3.888	3.244	2.206	1.672	1.322	1.095
Percent of variance explained	18.636	17.484	11.016	10.732	9.041	7.690

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Figure 6- 1. Average Rank for Six Latent Meat Attributes

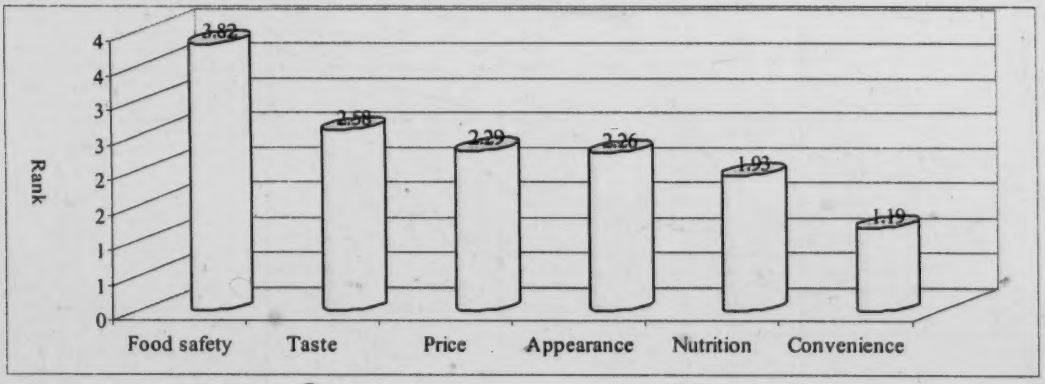


Table 6- 2. Percentage of Regrouped Ranks for Perceptions of Overall Meat Quality

Original rank	Regrouped rank	Percentage
1, 2 and 3	0	5.6%
4	1	20.9%
5	2	48.8%
6	3	19.4%
7	4	5.3%

Table 6- 3. Factor Scores for the Six Latent Meat Attributes

Respondent ID	Convenience	Appearance	Nutrition	Safety	Taste	Price
1	-0.350	-0.389	-0.666	-0.033	0.849	-0.180
2	-0.613	1.732	1.484	-1.210	-0.056	-1.083
3	-0.327	1.207	0.177	0.978	-0.305	1.254
4	-0.272	-1.448	0.345	0.862	0.815	-0.129
5	-0.707	0.927	-0.429	-2.472	0.652	1.073
6	-0.693	0.542	0.020	-2.441	0.245	1.352
8	-0.330	-0.851	-1.105	-0.461	1.710	-0.078
9	-0.373	-1.186	-0.028	-0.007	0.657	1.292
10	-0.333	-0.095	0.443	0.927	-0.131	-1.076
...	...	...	...	...	...	...
...	...	...	...	...	...	...
403	-.525	-.103	-1.065	-.796	-.068	-1.502
404	-.319	.384	-1.044	.283	1.155	-.827
405	-.442	.592	-.530	-.539	-.073	-.821
406	-.356	.999	-1.014	.302	.579	-.356
407	-.268	.567	-.934	.871	.286	-.221
408	-.417	.211	-.816	.158	-1.187	-.419
409	-.366	.870	-.942	-.007	.212	-.475
410	-.271	.531	.718	.730	1.371	-.255
411	-.368	-.419	-.660	.011	.458	.465
412	-.374	1.273	.188	.457	-.182	.823

Table 6- 4. Variables, Definition, Codes and Statistics for the Regression Analysis (N=412)

Independent Variables	Definition and Codes	Mean	Standard deviation
GENDER	Male=1, Female=0	0.437	0.497
COOK	Cook=1, otherwise=0	0.621	0.486
SHOPPER	grocery shopper =1, otherwise=0	0.665	0.473
MPURCHAS	Purchases in morning =1, otherwise =0	0.456	0.499
FREQSHOP	Purchases everyday =1, otherwise=0	0.308	0.462
HOMERAIS	Prefer meat from home raised animal=1, otherwise=0	0.791	0.407
IMPORT	Having purchased imported meat =1, otherwise =0	0.109	0.312
SUPERMARKET	Purchasing meat from supermarket=1, otherwise=0	0.124	0.330
WHOLESALER	Purchasing meat from wholesaler, otherwise=0	0.073	0.260
WETMARKET	Purchasing meat from wet market, otherwise=0	0.803	0.398
MARRIED	Married=1, Single=0	0.735	0.442
NATN	Han Nationality =1, otherwise=0	1.019	0.170
SNATN	Spouse's nationality is Han=1, otherwise=0	1.044	0.293
CHILD1	one child=1, otherwise=0	0.502	0.501
HSIZE	Size of household (1 – 8)	3.723	1.215
REFRIDGE	Has refrigerator =1, otherwise = 0	0.942	0.235
MICROWAVE	Has microwave oven = 1, otherwise =0	0.704	0.457
JOB	Works in a joint venture or foreign company=1, otherwise=0	0.170	0.376
GRAND	Living together with grandparents=1, otherwise=0	0.257	0.438
LINCOME	Monthly income < ¥ 3,000 =1, otherwise=0	0.333	0.472
MINCOME	Monthly income between ¥3,000-6000 =1, otherwise =0	0.6	0.491
HINCOME	Monthly income >¥ 6,000=1, otherwise=0	0.068	0.252
EDULOW	Elementary and high school = 1, otherwise=0	0.260	0.439
EDUMED	Technical school and College = 1, otherwise=0	0.461	0.499
EDUHIGH	University =1, ot[illegible]=0	0.279	0.449
SHANGHAI	Respondent from Shanghai=1, from Hangzhou=0	0.614	0.487
AGE1	34 or under 34 =1, otherwise=0	0.471	0.500
AGE2	35-54 years old=1, otherwise=0	0.427	0.495
AGE3	55 or above =1, otherwise=0	0.102	0.303

Table 6- 5. Estimation Result of OLS Regression for the Six Latent Meat Attributes (N=412)

Variables	Convenience		Appearance		Nutrition		Safety		Taste		Price	
	Coeff-icient	SE	Coeff-icient	SE	Coeff-icient	SE	Coeff-icient	SE	Coeff-icient	SE	Coeff-icient	SE
CONSTANT	0.034	0.194	0.031	0.196	-0.09	0.194	-0.459***	0.178	-0.146	0.153	0.501***	0.172
GENDER	0.165*	0.098	0.024	0.098	0.056	0.097	-0.211**	0.089	-0.162**	0.077	0.038	0.086
SHOPPER	0.009	0.106	0.016	0.107	-0.041	0.106	0.277***	0.097	-0.039	0.083	0.005	0.094
MPURCHASE	-0.12	0.095	0.045	0.096	0.242***	0.095	0.134	0.087	0.180**	0.075	-0.137*	0.084
FREQSHOP	-0.104	0.104	0.007	0.105	0.01	0.104	-0.055	0.095	0.150***	0.082	0.034	0.092
HOMERAISE	-0.171	0.116	-0.093	0.117	-0.092	0.116	0.272***	0.107	0.466***	0.092	-0.170*	0.103
IMPORT	0.554***	0.15	-0.082	0.152	0.035	0.15	-0.063	0.138	-0.101	0.119	0.221*	0.133
SUPERMARKET	0.364***	0.145	-0.071	0.146	0.442***	0.145	-0.08	0.133	0.167	0.114	-0.304**	0.128
WHOLESALER	-0.164	0.184	-0.563***	0.186	-0.440**	0.184	-0.105	0.169	-0.203	0.145	-0.553***	0.163
SHANGHAI	-0.196*	0.107	0.359***	0.108	-0.437***	0.107	0.273***	0.099	-0.102	0.085	-0.219**	0.095
H INCOME	0.135	0.148	-0.188	0.15	0.115	0.148	0.220*	0.136	0.076	0.117	-0.102	0.131
M INCOME	0.299***	0.105	-0.027	0.106	0.051	0.105	0.043	0.096	0.105	0.083	0.04	0.093
MICROWAVE	-0.068	0.111	0.101	0.112	0.228**	0.111	-0.161	0.102	-0.227***	0.087	-0.187*	0.098
GRANDPARENTS	-0.094	0.105	0.071	0.106	-0.058	0.105	-0.145	0.096	-0.280***	0.083	-0.122	0.093
EDUMED	0.046	0.119	-0.267**	0.12	0.17	0.119	0.181*	0.109	-0.048	0.094	-0.043	0.106
EDUHIGH	0.049	0.138	-0.305**	0.14	0.1	0.138	-0.097	0.127	0.01	0.109	0.115	0.122
Adjusted R^2	0.074		0.061		0.074		0.090		0.145		0.082	
F value	3.190		2.770		3.210		3.720		5.630		3.440	

Note: 1. *** indicates significant at p<0.01, ** significant at p<0.05, * significant at p<0.10

2. SE: standard error

Chapter 7. The Determinants of Consumers' Choice of Retail Outlets for Fresh Meat: Conditional Logit Analysis

7.1 Introduction

The determinants of respondents' choices of retail outlets were examined using conditional logit model in this chapter. The empirical results from conditional logit model are presented and results are discussed.

7.2 The Choice Set

Respondents were asked to indicate the retail outlets where they purchase fresh meat most often. Six retail outlets were identified in this study. The six retail outlets include wet markets, butcher shops, supermarkets, wholesalers, meat shops, and other shops. Respondents were asked to rate seven attributes of five retail outlets according to the types of retail outlets using a Likert scale, with 1 standing for the lowest level of an attribute and 5 standing for the highest level. The five retail outlets included wet market, butcher shop, supermarket, wholesaler, and meat shop. The category of other shops was not presented in the section of attribute ranking of retail outlets, and therefore was excluded from further analysis. The seven attributes of retail outlets were *overall meat price, overall meat quality, store location, customer service, shopping environment, meat certificate* and *meat selection*.

Table 7-1 shows the number of respondents for choices of retail outlets in China. Since no respondents chose butcher shops as the most frequently visited retail outlet and only two respondents chose meat shops, these two retail outlets were excluded from further analysis. Thus, only wet markets, supermarkets and wholesalers were included in the following analysis.

Table 7-2 shows the percentage of respondents who evaluated the various number of attributes of the three retail outlets. Ninety-three percent, eighty-six percent, and sixty-four percent of the respondents evaluated the seven attributes for wet markets, supermarkets and wholesalers respectively. While some respondents evaluated all the seven attributes of the retail outlet, others evaluated only some of the attributes. This may be related to respondents' awareness or knowledge of a specific type of retail outlet. Based on the number of attributes evaluated, a decision rule for awareness of a specific retail outlet was developed. As long as a respondent evaluated at least four out of the seven attributes for a specific retail outlet, it is assumed that he/she was aware of the retail outlet and would consider this outlet as a place to shop for meat. Thus, this outlet was included in his/her choice set of meat purchasing locations. Based on this decision rule, 37 respondents were found to be aware of only one retail outlet. These respondents' data were excluded from further analysis. As a result, the total number of observations for the analysis of choices of retail outlet section reduced to 329.

Table 7-3 presents respondents' awareness of retail outlets. 247 respondents (75%) were aware of all the three retail outlets, while 82 respondents (25%) were aware of only two of the three retail outlets.

Respondents appeared to face different choice sets. Some respondents have a choice set of three alternatives; others have a choice set of two. In other words, the number of alternatives in the choice set is not fixed but variable. According to Parsons and Kealy (1992), there is the possibility of bias due to erroneously including alternatives that individuals may not consider in their choice set. Including all of the alternatives in the study may overstate the number of alternatives available to the respondents (Parsons

and Kealy 1992: 96). Choosing alternatives based on someone's perceptions or awareness of an alternative may be thus more correct for this study (McLeod 1995). Conditional logit models were run for both full and varied choice sets of alternatives. The model with the full choice set assumed every respondent was aware of the three retail outlets. The models with the varied choice set assumed some respondents may be aware of the three retail outlets, and others aware of only two of them. The model performances for the different choice sets were compared.

7.3 Model Development

As noted in Chapter 4, it was assumed that respondents choose a particular retail outlet to maximize their utilities. Utility depends on z_{ij}, which includes individual respondent' characteristics and choice attributes. It is useful to distinguish the two. Let $z_{ij}=\lfloor x_{ij},\ w_i \rfloor$. Then x_{ij} is the attributes of retail outlets j perceived by respondent i and varies across the choice and possibly across the individuals; and w_i is the socio-economic and demographic characteristics of individual i and is the same for all the choices. Including only choice-specific variables, the conditional logit model can be specified as:

$$prob(Y_i = j) = \frac{e^{\beta' x_{ij}}}{\sum_{j=1}^{J} e^{\beta' x_{ij}}} \qquad (7\text{-}1)$$

Typically, researchers include choice-specific constants (ASCs) in a conditional logit model with choice-specific variables by using a set of $(J-1)$ number of dummy variables. The ASCs represent the response categories to capture the mean effects of the unobserved factors in the error terms (Ben-Akiva & Lerman 1985 and Wrigley 1985).

ASCs for supermarkets and wholesalers were chosen in the present study; while the ASC for wet markets was left out to avoid the singularity problem.

A mixed model which includes both choice-specific and individual-specific attributes may be specified (Liao 1994):

$$prob(Y_i = j) = \frac{e^{\beta' x_{ij} + \alpha' w_i}}{\sum_{j=1}^{J} e^{\beta' x_{ij} + \alpha' w_i}} = \frac{e^{\beta' x_{ij}} e^{\alpha' w_i}}{\sum_{j=1}^{J} e^{\beta' x_{ij}} e^{\alpha' w_i}} \qquad (7\text{-}2)$$

The final step in specifying the mixed conditional logit model is the choice of variables to be included in the model. Several models with different specifications were run. Mulit-collinearity problems were suspected at the beginning. Correlation coefficients between the seven explanatory variables were then estimated and summarized in Table 7-4. The correlation coefficients between *shopping environment and price, quality, location,* and *service* were all above 0.50. The correlation coefficients between *meat certification* and *quality, price, location, service,* and *environment* were above 0.50 as well. Therefore, *shopping environment* and *meat certification* were left out. As a result, *price, quality, location, customer service,* and *meat selection* were included in the analysis. A review of previous studies on store choices and a *priori* beliefs led to the inclusion of the following socio-economic and demographic variables in the model: INCOME, SHANGHAI, HOMERAISE, GENDER, FRQSHOP, MICROWAVE, HSIZE, and AGE. Table 7-5 presents a detailed description of the variables which are used in the conditional logit models.

It should also be mentioned that socio-economic and demographic variables are individual-specific variables which do not vary across the alternatives. In order to establish variations, the socio-economic and demographic variables interacted with ASCs

(Louviere et al. 2000). The socio-economic and demographic variables were interacted with the ASCs of supermarkets and wholesalers. For example, the variable income was interacted with the ASC of supermarkets, and represented by INCOME2. This interaction term expresses the effect of income on the probability of choosing supermarkets relative to wet markets. The variable income was also interacted with the ASC of wholesalers, and represented by INCOME3. This interaction term expresses the effect of income on the probability of choosing wholesalers relative to wet markets. In a similarly way, other socio-economic and demographic variables were interacted with the ASCs of supermarkets and wholesalers.

7.4 Estimation results

Conditional logit models were estimated, using maximum likelihood procedures, by LIMDEP version 7.0 (Greene 1997). Several specifications of the conditional logit models were estimated. Four of these are presented in this study. The first two models are for the varied choice set: one with attributes for the retail outlets only (Model 1) and another one with attributes of retail outlets and respondents' socio-economic and demographic characteristics (Model 2). The other two conditional logit models are for the full choice set: one with attributes of retail outlets only (Model 3) and another one with attributes of retail outlets and socio-economic and demographic characteristics (Model 4).

The goodness-of-fit can be measured by McFadden's pseudo R^2 statistics, which is analogous to R^2 in ordinary regression. These statistics are reported with the model estimation results. The pseudo R^2 statistic was 0.038 for model 1, and was higher than that in model 3 ($R^2 = 0.32$). Additionally, the pseudo R^2 statistic was higher in model 2 (pseudo $R^2 = 0.194$) as compared to that in model 4 (pseudo $R^2 = 0.164$). The higher the

value of pseudo R^2 statistic, the better the goodness-of-fit of a model. Therefore, overall model performances of Model 1 and Model 2 are better than those of Model 3 and Model 4.

Another method to measure the model performances is to compare the correct predictions of choices. Table 7-6 presents the correct prediction of choices for the four models. The table shows the number of predicted choices that were actually taken for each choice. The diagonal elements of the table show the number of correct predictions, or, the number of predicted choices to the alternatives of retail outlets that were actually chosen. The percent correct predictions are the sum of the diagonal elements divided by the total number of choices. Model 1 has a higher of correct prediction than that of Model 3 by 1%. Similarly, model 2 has a higher percentage of correct prediction than that of Model 4 by 1%.

Both two methods confirm the statements that choosing alternatives based on respondents' perceptions or awareness of alternatives is more correct (Parsons and Kealy 1992 and MaLeod 1995). In addition, Model 3 and Model 4 have all the of the same signs on the coefficients, similar t-ratios and standard errors as compared to those of the Model 1 and Model 2. Based on the above reasons and for simplicity in explanation, the estimation results of model 1 and model 2 were chosen and were presented in Table 7-7. The estimation results of model 3 and model 4 with full choice set are presented in Appendix 3.

The estimated coefficients for the ASCs for both Model 1 and Model 2 were both negative and significant at a 1 percent level of significance. The results suggest that these ASCs were statistically important measures of the influences of the random components.

The significantly negative coefficient of the ASC for SUPERMARKET suggests that all else equal, wet markets are preferred to supermarket. The coefficient for ASC of WHOLESALER was also negative and significant. This suggests that wet markets are preferred to wholesalers, ceterus paribus. It is noteworthy that magnitude of the coefficient for WHOLESALER is less than that for SUPERMARKET. This suggests that wholesalers were the least popular retail outlet among the three retail outlets. The results are consistent with the survey data. Wet markets are the most frequent visited retail outlet for respondents to purchase fresh meat products, followed by supermarkets and wholesalers as presented in Table 7-1.

Model 1

In model 1, the coefficients of PRICE, QUALITY, LOCATION and SERVICE had expected sign and were significantly related to the choices of retail outlet. If an estimated coefficient of an explanatory variable has a positive sign, it suggests that the higher a store attribute is perceived, the more customer a retail outlet can draw, and vice versa. The coefficient of SELECTION was not significantly different from zero. This indicate the coefficient of SELECTION did not have significant impact on respondents' choices of retail outlets. The estimated coefficient of PRICE was negative and significant at a 5 percent level of significance, suggesting that the lower the overall price a retail outlet offers, the more customers it can attract. The estimated coefficient of QUALITY was positive and significant at a 5 percent level of significance. This suggests that the better meat quality a retail outlet provides, the more customers the retail outlet attracts. Similarly, the estimated coefficients of LOCATION and SERVICE were positive and significant at a 10 percent level of significance, suggesting that better location or better customer service may attract more customers.

Model 2

In model 2, only the coefficients of PRICE and QUALITY were statistically significantly related to the choices of retail outlets, while alternative-specific attributes such as LOCATION, SERVICE and SELECTION were not statistically significant. The enclosure of socio-economic and demographic variables caused changes in parameter estimates and higher standard errors, and some of the estimated parameters that were statistically significant in model 1 were no more significant. The problems may arise from multi-collinearity and the number of estimated coefficients relative to the sample size in model 2. The interpretations of the coefficients of PRICE and QUALITY are similar as in model 1.

Most of the socio-economic and demographic variables have statistically significant effects on respondents' choices of retail outlets. This indicates that the socio-economic and demographic characteristics of respondents influence their choice of retail outlets.

The estimated coefficient of INCOME2 was positive and statistically significant at a 5 percent level of significance. This suggests that respondents who have high incomes prefer to buy meat from supermarkets as compare to those who have low incomes. The sign of the estimated coefficient was as expected. Respondents who have high incomes may afford to buy meat from supermarkets at higher price. As indicated in Chapter 5, the overall meat price asked by supermarkets is the highest, followed by that of wet market and wholesaler. The estimated coefficient of INCOME3 was not significant, suggesting that income does not play an important role in consumer's decision whether to buy from wholesalers or wet markets.

The estimated coefficient of SHANGHAI2 was positive and significant at a 5 percent level of significance. This suggests that Shanghai respondents prefer supermarkets more than Hangzhou respondents. The estimated coefficient of SHANGHAI3 was positive and significant at a 5 percent level of significance. This suggests that Shanghai respondents prefer wholesalers more than Hangzhou respondents.

The estimated coefficient of HOMERAISE2 was negative and significant at a 5 percent level of significance. This suggests that respondents who prefer to eat meat from home raised animals prefer supermarkets less. The estimated coefficient of HOMERAISE3 was positive and significant at a 5 percent level of significance, This indicates respondents who prefer eat meat from home raised animals prefer wholesalers to wet markets.

The estimated coefficient of GENDER2 was not significant. This indicates that gender may not be relevant in respondents' decision to purchase from supermarkets or wet markets. The estimated coefficient of GENDER3 was positive and significant at a 5 percent level of significance. This indicates that male respondents prefer wholesalers to wet markets as compared to female respondents.

The estimated coefficient of FREQSHOP2 was positive and significant at a 5 percent level of significance. This may show that respondents who purchase grocery more often prefer supermarkets to wet markets. The estimated coefficient of FREQSHOP3 was not significant, suggesting that shopping frequency does not play an important role in consumer's decision whether to buy from wholesalers or wet markets.

The estimated coefficients of MICROWAVE2, HSIZE2 and AGE2 were not statistically significant. This suggests that these variables were not relevant in

respondents' decisions to purchase meat from supermarkets or wet markets. The estimated coefficient of MICROWAVE3 was positive and significant at a 1 percent level of significance, indicating that respondents who have microwave oven prefer wholesalers to wet markets. The estimated coefficient of HSIZE3 was positive and significant at a 1 percent level of significance, indicating that respondents who have larger household size prefer wholesalers to wet markets. The estimated coefficient of AGE3 was negative and significant at a 1 percent level of significance, indicating that older respondents prefer wet markets to wholesalers as compared to younger respondents.

7.4.1 Model 1: Marginal Effects

The interpretation of the estimation results may be enhanced by looking at the marginal effects of the variables. The marginal effects were calculated only for those variables which were statistically significant in model 1 and are presented in Table 7-8.

For any conditional logit models, the marginal effects across the response categories should cancel out. The condition is fulfilled in this case. The 3-by-3 matrices of marginal effects are for alternative-specific variables such as PRICE, QUALITY, LOCATION and SERVICE. For an additional unit increase in price of fresh meat at wet markets, the corresponding probability for selecting wet markets will decrease by approximately 0.048; while the probabilities of shopping meat at supermarkets and wholesalers will increase by 0.031 and 0.017 respectively. An additional unit increase in price of fresh meat at supermarkets, the probability for selecting from supermarkets will decrease by approximately 0.034; while the probabilities for wet markets and wholesalers will increase by 0.031 and 0.004 respectively. An additional unit increase in price of fresh meat at wholesalers, the probability for selecting from the wholesalers will decrease by

approximately 0.021, while the probabilities for wet markets and supermarkets will increase by 0.004 and 0.021 respectively.

For an additional increase in the quality of fresh meat at wet markets, the probability of choosing wet markets will increases by 0.050; while the probabilities of choosing supermarkets and wholesalers will decrease by 0.032 and 0.018 respectively. For an additional increase in the quality of fresh meat at supermarkets, the probability of shopping at supermarkets will increase by 0.036, and the probability of choosing from wet markets and wholesalers decreases by 0.032 and 0.004 respectively. Follow the same fashion, for an additional increase in the quality of fresh meat at wholesalers, and the probability of choosing wholesalers will increase by 0.022, and the probabilities of choosing wet markets and supermarkets decrease by 0.018 and 0.004 respectively.

Overall the marginal effects are consistent with the model results that are reported in Table 7-7. Better locations and customer service of retail outlets may attract more consumers.

7.4.2 Model 2: Marginal Effects

The marginal effects were calculated only for those variables which were statistically significant in model 2 and are presented in Table 7-9. The interpretation of the marginal effects of PRICE and QUALITY are similar as those in Model 1.

Only the marginal effects of the socio-economic and demographic variables were discussed in detail here. A positive marginal effect indicates that the probability of choosing a particular retail outlet increases, while negative marginal effect indicates the opposite. For example, for an additional unit increase in respondent's incomes, the estimated marginal effect of purchasing meat from supermarkets will increase by 0.020.

The estimated marginal effects for SHANGHAI may show that Shanghai respondents are more likely to purchase meat from supermarkets and wholesalers. The estimated marginal effects of HOMERASIE indicate that respondents who like meat from home raised animals prefer wet markets and wholesalers. The estimated marginal effects of FREQSHOP suggest that respondents who purchase more frequently prefer supermarkets and wet markets. The estimated marginal effect of GENDER suggests that male respondents prefer wholesalers. The estimated marginal effect of MICROWAVE implies that respondents who have microwave oven would like wholesalers better. The estimated marginal effect for HSIZE may show that respondents who have bigger household size like wholesalers better. The estimated marginal effect of AGE shows that older respondents prefer to purchase meat from supermarkets.

Table 7- 1. The Distribution for Retail Outlets Where Consumers Purchase Most of Their Meats in Hangzhou and Shanghai, China (N=427)

	Retail outlets						
	Wet market	Butcher Shop	Supermarket	Wholesaler	Meat shop	Other	No Response
Number of Responses	284	0	52	30	2	4	55

Table 7- 2. Number of Respondents Who Evaluated Various Attributes of Retail Outlets (N=427)

Retail Outlet	Number of Attributes							
	Seven	Six	Five	Four	Three	Two	One	Zero
Wet market	93%	3%	1%	0%	0%	0%	0%	2%
Supermarket	86%	4%	1%	0%	0%	1%	0%	7%
Wholesaler	64%	3%	1%	0%	1%	1%	2%	27%

Table 7- 3. The Number of Respondents Who Were Aware of the Characteristics of Retail Outlets and the Subsequent Number of Respondents in Each of Tow Choice Set Sizes (N=329)

	Awareness of Retail Outlets			Choice -sets	
	Supermarket	Wet market	Wholesaler	Two-choice set	Three-choice set
Number of Responses	329	329	247	82	247

Table 7- 4. Correlation Matrix for Attributes of Retail Outlets in Hangzhou and Shanghai, 2000

	PRICE	QUALITY	LOCATION	SERVICE	ENVIRONMENT	CERTIFICATE	SELECTION
PRICE	1.000						
QUALITY	0.478	1.000					
LOCATION	0.435	0.474	1.000				
SERVICE	0.417	0.474	0.505	1.000			
ENVIRONMENT	0.568	0.579	0.536	0.607	1.000		
CERTIFICATE	0.520	0.636	0.510	0.582	0.729	1.000	
SELECTION	-0.066	0.013	0.046	0.139	-0.018	0.124	1.000

Table 7- 5. Description of Store Attributes and Socio-economic and Demographic Variables for Meat Consumers in Hangzhou and Shanghai, 2000

Variable Code	Variable Descriptions
WETMARKET	Alternative specific constant for wet market
SUPERMARKET	Alternative specific constant for super market
WHOLESALER	Alternative specific constant for wholesaler
PRICE	The rating (1-5) for the overall meat prices offered by the three retail outlets.
QUALITY	The rating (1-5) for the overall meat quality offered by the three retail outlets.
LOCATION	The rating (1-5) for the convenience of store location of the three retail outlets
SERVICE	The rating (1-5) for the Customer service offered by the three retail outlets
SELECTION	The rating (1-5) for the variety of meat products provided by the three outlets.
INCOME	Less than Y500=1, Y500-Y1,000=2, Y1,000-2,000=3, Y2,000-3,000=4, Y3,000-4,000=5, Y4,000-Y5,000=6, Y5,000-6,000=7, Y6,000-7,000=8, Y7,000-8,000=9, Y8,000-Y9,000=10, Y9,000-10,000=11, Over 10,000=12
SHANGHAI	Respondents who live in Shanghai=1, Hangzhou=0
HOMERAISE	Respondents who prefer meat from a home raised animal=1, otherwise=0
GENDER	Male=1, Female=0
FREQSHOP	Purchase frequency, Purchase twice a week = 1; purchase thrice or more, but not everyday =2; purchase everyday =3
MICROWAVE	Possessing microwave oven=1, otherwise=0
HSIZE	Household size, from 1 to 8 or more.
AGE	Respondents' age, under 24=1, 25-34 years =2, 35-44 years=3, 45-54 years =4, 55-56 years = 5, 65 and over = 6

Table 7- 6. Correct Predictions of Choices for the Four Conditional Logit Model

Model 1 (Variable choice set)

	Predicted choice			
Retail Outlet	Wet market	Supermarket	Wholesaler	Total
Wet market	198	35	19	252
Supermarket	34	8	4	47
Wholesaler	19	4	4	27
Total	252	47	27	326
% of correct prediction		64%		

Model 2 (Variable choice set)

	Predicted choice			
Retail Outlet	Wet market	Supermarket	Wholesaler	Total
Wet market	205	32	16	252
Supermarket	32	12	2	47
Wholesaler	15	3	9	27
Total	252	47	27	326
% of correct prediction		69%		

Model 3 (Full choice set)

	Predicted choice			
Retail Outlet	Wet market	Supermarket	Wholesaler	Total
Wet market	196	35	21	252
Supermarket	34	8	5	47
Wholesaler	22	4	4	30
Total	252	47	30	329
% of correct prediction		63%		

Model 4 (Full choice set)

	Predicted choice			
Retail Outlet	Wet market	Supermarket	Wholesaler	Total
Wet market	203	31	18	252
Supermarket	32	12	3	47
Wholesaler	18	3	9	30
Total	252	47	30	329
% of correct prediction		68%		

Table 7- 7. Estimation Results of Conditional Logit Model With Varied Choice Sets

Variables	Model 1 Coefficient	Model 1 Standard Error	Model 2 Coefficient	Model 2 Standard Error
Attributes of Retail Outlets				
PRICE	-0.2869**	(0.1351)	-0.3124*	(0.1629)
QUALITY	0.2999**	(0.1477)	0.4644***	(0.1784)
LOCATION	0.2072*	(0.1164)	0.0773	(0.1355)
SERVICE	0.2319*	(0.1449)	0.2214	(0.1656)
SELECTION	-0.1350	(0.1302)	-0.2359	(0.1459)
Socio-economic and demographic Characteristics				
SUPERMARKET	-1.8601***	(0.2224)	-3.7650***	(1.3355)
INCOME2			0.1867**	(0.0829)
SHANGHAI2			1.1045**	(0.4538)
HOMERAISE2			-0.7291**	(0.3755)
GENDER2			0.1338	(0.3647)
FREQSHOP2			0.6820**	(0.3453)
MICROWAVE2			-0.1421	(0.5107)
HSIZE2			-0.1134	(0.1740)
AGE2			-0.1459	(0.1611)
WHOLESALER	-1.7663***	(0.2295)	-7.1351***	(2.2313)
INCOME3			-0.0070	(0.1086)
SHANGHAI3			1.2415**	(0.6107)
HOMERAISE3			1.3584**	(0.6825)
GENDER3			1.0925**	(0.4952)
FREQSHOP3			-0.5884	(0.6006)
MICROWAVE3			2.1245*	(1.1054)
HSIZE3			0.8444***	(0.2066)
AGE3			-0.5400***	(0.2105)
Unrestricted Log Likelihood function	-207.130		-173.617	
Restricted (slopes=0) log likelihood function	-215.293		-215.293	
Chi-Squared (χ^2)	16.326		83.352	
McFadden's pseudo R^2 Statistic	0.038		0.194	

***significant at p<0.01, ** significant at p<0.05, * significant at p<0.1

Table 7- 8. Estimated Marginal Effects for the Attributes of Retail Outlets and the Socio-economic and Demographic Variables on Choice Probability for Model 1

Independent variable	Wet market	Supermarket	Wholesaler
PRICE			
Wet market	-0.048	0.031	0.017
Supermarket	0.031	-0.034	0.004
Wholesaler	0.017	0.004	-0.021
QUALITY			
Wet market	0.050	-0.032	-0.018
Supermarket	-0.032	0.036	-0.004
Wholesaler	-0.018	-0.004	0.022
LOCATION			
Wet market	0.034	-0.022	-0.012
Supermarket	-0.022	0.025	-0.003
Wholesaler	-0.012	-0.003	0.015
SERVICE			
Wet market	0.039	-0.025	-0.014
Supermarket	-0.025	0.028	-0.003
Wholesaler	-0.014	-0.003	0.017

Table 7- 9. Estimated Marginal Effects of Store Attributes and Socio-economic and Demographic Variables on Choice Probability for Model 2

	Wet market	Supermarket	Wholesaler
PRICE			
Wet market	-0.045	0.031	0.014
Supermarket	0.031	-0.034	0.003
Wholesaler	0.014	0.003	-0.017
QUALITY			
Wet market	0.067	-0.045	-0.021
Supermarket	-0.045	0.050	-0.005
Wholesaler	-0.021	-0.005	0.026
INCOME2	-0.018	0.020	-0.002
SHANGHAI2	-0.108	0.119	-0.011
HOMERAISE2	0.071	-0.078	0.007
FREQSHOP2	-0.067	0.073	-0.007
SHANGHAI3	-0.057	-0.012	0.069
HOMERAISE3	-0.063	-0.013	0.076
GENDER3	-0.050	-0.011	0.061
FREQSHOP3	0.027	0.006	-0.033
MICROWAVE3	-0.098	-0.021	0.119
HSIZE3	-0.039	-0.008	0.047
AGE3	0.025	0.005	-0.030

Chapter 8. Summary, Conclusions and Marketing Implications

8.1 Summary and Conclusions

An empirical investigation of respondents' perceptions of eighteen attributes of fresh meat and their choices of retail outlets in Hangzhou and Shanghai was conducted in this study. The study revealed that the most important attributes were *inspection stamps and certificates, no chemical additives* and *freshness,* while *meat cut to specifications, variety in cuts and forms*, and *seasoned and ready-to-cook meat* were the three least important attributes. The main retail outlets in China were wet markets, supermarkets and wholesalers. Seventy-six percent of the respondents purchased most of their fresh meat from wet markets, fourteen percent from supermarkets, and eight percent from wholesalers.

To evaluate the effects of the demographic and socio-economic characteristics on the Chinese consumers' preferences for the attributes of fresh meat, OLS regression analysis was utilized. The results from the regression analysis indicated that male respondents, respondents who purchased imported meat recently, respondents who bought most of their groceries at supermarkets, and respondents in the middle income group cared more about *convenience*. Respondents who shopped at wet markets, respondents from Shanghai, and respondents in a low education group cared more about *appearance*. Morning meat shoppers, supermarket shoppers, and respondents who had microwave ovens valued *nutrition* higher. *Safety* was valued higher by respondents who were the major grocery shoppers for their families, respondents who liked to eat meat from home-raised animals, respondents from Shanghai, and respondents who have middle educations. *Taste* was found to be more important to respondents who purchased

meat in the morning, respondents who purchased meat everyday, and respondents who liked to eat meat from home-raised animals. *Price* was valued less by respondents who purchased meat in the morning; respondents who liked to eat meat from home-raised animals, respondents bought grocery from supermarkets and wholesalers, and Shanghai respondents.

A conditional logit model was applied to examine how various attributes of retail outlets and respondents' socio-economic and demographic characteristics influenced respondents' choice of retail outlets. Results from the conditional logit model indicated that the *overall meat quality* and *overall meat price* of retail outlets were the two key determinants of choices of retail outlets. Respondents' socio-economic and demographic characteristics were found to affect respondents' choices of retail outlets significantly. Respondents who had high incomes, respondents who were located in Shanghai, and respondents who bought meat everyday were more likely to buy meat from supermarkets. Respondents who liked to eat meat from home-raised animals were less likely to buy meat from supermarkets. The likelihood of purchasing meat from wholesalers was higher for male respondents and respondents who liked to eat meat from home-raised animals. Microwave oven ownership, being located in Shanghai, larger household size, and being young have positive relationships with a probability of buying meat from wholesaler.

8.2 Marketing Implications

Several researchers forecasted that rapid economic growth, changing household food consumption, China's recent entry into the WTO, and increasingly mature retail system in China would bring about favorable livestock marketing and trade opportunities

to China both nationally and internationally. This study provides some insights into the marketing of meat products in Chinese markets.

1. The results from the importance rankings of eighteen attributes suggest that processors, wholesalers, and retailers should focus on food safety attributes since these attributes were valued highest by the respondents. An effective strategy is to develop safe and quality meat products and recipes and to build up specific brands which emphasize safety and quality attributes. The Chinese are attracted to reputed or established brand names, which they consider as a proof of authenticity and superior quality (Moustakerski and Brabant 2001).

2. The empirical results from the regression analysis suggested that respondents' socio-economic and demographic characteristics (e.g., location, gender, and income) influence their perceptions of meat attributes. This implies that it is important for meat exporters and other domestic marketing agents to recognize the heterogeneity of Chinese meat consumers. Hangzhou and Shanghai are both at the southeast of China, and the distance between the two cities are only 195 km. Due to the vastness of mainland China, the differences among western, eastern, southern and northern part of China could be greater.

3. Empirical results revealed that food safety attributes have become sensitive or important factors among respondents who are female, respondents who are grocery shoppers, respondents who liked to eat meat from home-raised animals, respondents who purchased meat everyday, respondents who were from Shanghai, and respondents who had college educations. This suggests that marketing promotion strategies should emphasize these consumer segments.

4. Meat price was found to be a less sensitive factor among respondents from Shanghai, respondents who liked to purchase meat in the morning, respondents who liked to eat from home-raised animals, and respondents who owned microwaves. Marketing strategies that target this niche market benefit from charging premium prices and supplying safer and better quality meat products.

5. Meat *appearance* was found to be an important meat attribute for respondents from Shanghai, respondents who purchased meat from wet markets, and respondents who had low educations. In order to benefit from this consumer segment, the marketing strategies may focus on improving the *appearance* of meat. Chinese consumers respond to the attractiveness of packaging by taking its size, color and design into careful consideration (Moustakerski and Brabant 2001). In addition, packaging is an effective tool to educate consumers and advertise products.

6. Supermarkets are increasingly popular and mature in China. They are taking an increasing market share from the traditional meat retail outlets, such as wet markets, wholesalers, meat shops, and butch shops by providing added convenience, product selection and improved sanitation. Consumers have showed an increasing fondness for better shopping environments, and are willing to pay a premium for safe, nutritious, and healthy meat products. Foreign exporters and domestic producers can target supermarkets as an entry to the vast Chinese meat market. Opening supermarkets is a typical way for potential exporters to start business in China. Outdoor wet markets are declining in their importance since the Chinese government has begun to clean up the streets and tax all sales of food products.

7. The results from the conditional logit model indicate that meat price and

meat quality were the two key significant attributes affecting consumers' choices of retail outlets. Average disposable incomes and per capita food consumption in China are still low. Food expenditure accounts for more than 50% of the total disposable income. One of the key factors for success in the Chinese meat market is to provide competitive prices and simultaneously improve the quality of meat products.

8. The empirical results from the conditional logit model suggest that respondents' socio-economic and demographic characteristics influenced their choices of retail outlets. Respondents who had high income and respondents from Shanghai were more likely to buy meat from supermarkets. This suggests that foreign exporters and domestic meat marketers should focus on supermarkets in large cities and regions/consumers with high incomes.

8.3 Study Limitations

The present study has several limitations.

First, the study only presents a general picture of the Chinese meat market. In this study, meat attributes were not investigated by type (e. g. beef, chicken, and pork). Future studies should examine the meat industry by considering the importance of the trends and preferences for each type of meat. Doing so may provide more specific and in-depth information on the importance of a particular meat type and will be helpful for retailers who wish to capture a niche market.

Second, 18 meat attributes were investigated in the present study. The limitation with this approach is the fact that consumers may have difficulties in comprehending the eighteen attributes. Future studies focus on the most important meat attributes identified in this study, such as food safety attributes, price and appearance. Conjoint analysis,

contingent valuation, the experimental auction method or other analytical tools can be explored to obtain consumers' perceptions of specific meat attributes.

Third, further marketing research may focus on secondary cities to explore the vastness of China's meat market. Supermarkets still remain an urban phenomenon, with over 80% of all supermarket sales occurring in cities; more than half of supermarkets are in major municipalities and provincial capitals (Moustakerski and Brabant 2001). However, with continued promising economic growth and implementation of WTO terms, numerous secondary cities are becoming more developed and might be considered as potential markets in the future.

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Appendix 1. The Survey Instrument

Meat Survey – Consumers

Date: _____ Time: _____ Location: _____

Gender: _____Male _____Female

1. Are you the person that normally does the grocery shopping? ____Yes ___No If No, who? _____
2. Are you the person who prepares the main meals? ____Yes ___No If No, who? _____
3. You normally shop: ___ At early morning _____During daytime _____After work
4. Please evaluate each of the following fresh meat characteristics, in terms of how important the characteristic is to you personally, by circling a number.

Characteristics	Not at all Important	Not Very Important	Somewhat Important	Very Important	Extremely Important
No Chemical Additives	1	2	3	4	5
Tenderness	1	2	3	4	5
Inspection Stamp & Certifications	1	2	3	4	5
Leanness	1	2	3	4	5
Freshness	1	2	3	4	5
Color of meat	1	2	3	4	5
Flavor	1	2	3	4	5
Whiteness of fat	1	2	3	4	5
Variety in cuts & forms	1	2	3	4	5
Seasoned & Ready-to-Cook Meat	1	2	3	4	5
Proper Packaging	1	2	3	4	5
Purchase Convenience	1	2	3	4	5
Meat Cuts to Your Specifications	1	2	3	4	5
Competitive Price	1	2	3	4	5

Knowing Where Meat Comes From	1	2	3	4	5
Smell	1	2	3	4	5
Health-ness (e.g. low in fat)	1	2	3	4	5
Cleanliness	1	2	3	4	5

5. Please rank the 10 meat characteristics, in order of importance when purchasing meat. Rank from 1 to 10.
(1- being the least important and 10 - the most important). No repeat number- use only one number once.

Freshness	Appearance	Price	Food Safety	Health-ness	Flavor	Tenderness	Smell	Origin	Easiness to Prepare

6. What is your overall opinion of the **QUALITY** of fresh meat that you are currently purchasing? Please circle a number.
Poor 1 2 3 4 5 6 7 Excellent

7. Last month, how much money did you spend on and how many kg did you purchase the following meat and fish (including fresh, frozen, cooked, and dried)?

	Fresh		Frozen		Cooked		Dried	
	$	kg	$	kg	$	kg	$	kg
Pork								
Pork Offal								
Beef								
Beef Offal								
Chicken								
Chicken Offal								
Duck								
Duck Offal								
Mutton								
Fish								
Other Meats								

8. How often do you buy meat? ____Everyday ____Twice a week ____Thrice or more but not everyday

9. Have you recently experienced difficulty in getting offal?
Pork Offal ___Yes ___No If yes, which parts? _____
Beef Offal ___Yes ___No If yes, which parts? _____
Chicken Offal ___Yes ___No If yes, which parts? _____

10. In the past month, how much money do you spend on the food (including dining-out)?_____$/month

11. In the past month, how much money do you spend on the food (including dining-out)?_____$/month

12. When you dine out, which meat are you most likely to eat (M) and which meat least likely to eat (L)?

____Pork ____Pork Offal ____Beef ____Beef Offal ____Chicken _____Chicken Offal

13. In the future, which meat are you most likely to eat more (M) and which meat least likely to eat (L)?
____Pork ____Pork Offal ____Beef ____Beef Offal ____Chicken _____Chicken Offal

14. Have you recently purchased the following imported meat?

Pork:	___Yes ___No	If yes, which country?	_____
Pork offal:	___Yes ___No	If yes, which country?	_____
Beef:	___Yes ___No	If yes, which country?	_____
Beef offal:	___Yes ___No	If yes, which country?	_____
Chicken:	___Yes ___No	If yes, which country?	_____
Chicken offal:	___Yes ___No	If yes, which country?	_____

15. In your opinion, which country produces the best quality of the following meat?
_____Pork _____Pork Offal _____Beef _____Beef Offal _____Chicken _____Chicken Offal

16. In your opinion, which type of animal produces the best quality of the offal?
_____Young Animal _____Old Animal _____Domestic Breed _____Foreign Breed _____Don't Know

17. Do you prefer home raised animal or bird? ____Yes ___No
If Yes, why?

18. Please mark where you had purchased your meat before and identify where you buy MOST of your fresh meat with *:
___ Small Butcher ____ Supermarket ___ Wet/Free Market _____Wholesale market
___ Meat Shop ____Other

19. Please complete the following table regarding where you purchase your pork:

Did you purchase the following pork cuts or parts last month?	**Yes**	**No**	**If Yes, please mark the store or place you purchased the pork cuts or parts last month and identify the most important store or place by *:**					
			Wet/Free Market	**Small Butcher**	**Supermarket**	**Wholesale Market**	**Meat Shop**	
Tenderloins	□	□	□	□	□	□	□	
Middle cuts	□	□	□	□	□	□	□	
Leg	□	□	□	□	□	□	□	
Bellies	□	□	□	□	□	□	□	
Riblet	□	□	□	□	□	□	□	
Ground Pork	□	□	□	□	□	□	□	
Shoulder /Ham	□	□	□	□	□	□	□	
Seasoned Pork	□	□	□	□	□	□	□	
Variety Meats								
Head	□	□	□	□	□	□	□	
Brain	□	□	□	□	□	□	□	
Ear	□	□	□	□	□	□	□	
Tongue	□	□	□	□	□	□	□	
Heart	□	□	□	□	□	□	□	
Liver	□	□	□	□	□	□	□	
Foot	□	□	□	□	□	□	□	

Stomach	□	□	□	□	□	□	□	
Kidney	□	□	□	□	□	□	□	
Tail	□	□	□	□	□	□	□	
Diaphragm	□	□	□	□	□	□	□	

20. Please complete the following table regarding where you purchase your chicken:

Did you purchase the following chicken cuts or parts last month?	**Yes**	**No**	**If Yes, please mark the store or place you purchased the chicken cuts or parts last month and identify the most important store or place by *:**					
			Wet/Free Market	**Small Butcher's Shop**	**Supermarket**	**Wholesale Market**	**Meat Shop**	
Live Chicken	□	□	□	□	□	□	□	
Frozen Whole Chicken	□	□	□	□	□	□	□	
Breast	□	□	□	□	□	□	□	
Whole Leg	□	□	□	□	□	□	□	
Seasoned Chicken	□	□	□	□	□	□	□	
Variety Meats								
Drum-stick	□	□	□	□	□	□	□	
Whole wing	□	□	□	□	□	□	□	
Wing tips	□	□	□	□	□	□	□	
End wing	□	□	□	□	□	□	□	
Middle wing	□	□	□	□	□	□	□	
Liver	□	□	□	□	□	□	□	
Paw	□	□	□	□	□	□	□	
Gizzards	□	□	□	□	□	□	□	
Kidney	□	□	□	□	□	□	□	
Trimmings	□	□	□	□	□	□	□	
Intenstine	□	□	□	□	□	□	□	

21. Please complete the following table regarding where you purchase your beef:

Did you purchase the following beef cuts or parts last month?	**Yes**	**No**	**If Yes, please mark the store or place you purchased the beef cuts or parts last month and identify the most important store or place by *:**					
			Wet/Free Market	**Butcher's Shop**	**Supermarket**	**Wholesale Market**	**Meat Shop**	
Tenderloins	□	□	□	□	□	□	□	
Middle cuts	□	□	□	□	□	□	□	
Leg	□	□	□	□	□	□	□	
Bellies	□	□	□	□	□	□	□	

Rib	□	□	□	□	□	□	□	
Shank	□	□	□	□	□	□	□	
Hot Pot Slice	□	□	□	□	□	□	□	
Ground Beef	□	□	□	□	□	□	□	
Shoulder /Ham	□	□	□	□	□	□	□	
Seasoned	□	□	□	□	□	□	□	
Variety Meats								
Tendons	□	□	□	□	□	□	□	
Brain	□	□	□	□	□	□	□	
Ear	□	□	□	□	□	□	□	
Tongue	□	□	□	□	□	□	□	
Heart	□	□	□	□	□	□	□	
Liver	□	□	□	□	□	□	□	
Foot	□	□	□	□	□	□	□	
Tripe/Honeycomb	□	□	□	□	□	□	□	
Omasum	□	□	□	□	□	□	□	
Kidney	□	□	□	□	□	□	□	
Tail	□	□	□	□	□	□	□	
Intenstine	□	□	□	□	□	□	□	

22. Based on your own experience, evaluate each of the following store or market characteristics by marking the number from 1 to 5:

Meat Price		Inexpensive				Expensive
	Wet/Free Market	1	2	3	4	5
	Butcher	1	2	3	4	5
	Supermarket	1	2	3	4	5
	Meat Shop	1	2	3	4	5
	Wholesaler	1	2	3	4	5
Meat Quality		Poor				Excellent
	Wet/Free Market	1	2	3	4	5
	Butcher	1	2	3	4	5
	Supermarket	1	2	3	4	5
	Meat Shop	1	2	3	4	5
	Wholesaler	1	2	3	4	5
Location		Not Convenient				Convenient
	Wet/Free Market	1	2	3	4	5
	Butcher	1	2	3	4	5
	Supermarket	1	2	3	4	5
	Meat Shop	1	2	3	4	5
	Wholesaler	1	2	3	4	5
Service		Poor				Good
	Wet/Free Market	1	2	3	4	5
	Butcher	1	2	3	4	5
	Supermarket	1	2	3	4	5
	Meat Shop	1	2	3	4	5
	Wholesaler	1	2	3	4	5
Shopping Environment		Poor				Good
	Wet/Free Market	1	2	3	4	5
	Butcher	1	2	3	4	5

	Supermarket	1	2	3	4	5
	Meat Shop	1	2	3	4	5
	Wholesaler	1	2	3	4	5

Meat		Less Faith				More Faith
Certification	Wet/Free Market	1	2	3	4	5
	Butcher	1	2	3	4	5
	Supermarket	1	2	3	4	5
	Meat Shop	1	2	3	4	5
	Wholesaler	1	2	3	4	5

Meat		Poor				Good
Selection	Wet/Free Market	1	2	3	4	5
	Butcher	1	2	3	4	5
	Supermarket	1	2	3	4	5
	Meat Shop	1	2	3	4	5
	Wholesaler	1	2	3	4	5

23. Are you married? ___Yes ___No

24. What is your nationality? __Han ____Hui __Other

25. What is your spousal nationality? __Han ____Hui __Other

26. Do you own refrigerator? ____Yes ___No Do you own microwave? __Yes __No

27. How many dependent children do you have?

__1 __2 __3 __4 __5 or more.

28. Are there any child's grandparents lived in your home? ____Yes ____No

29. Size of household (family members who live together)? Please check one.
__1 __2 __3 __4 __5 __6 __7 __8 or more.

30. What is your current MONTHLY family income from all sources? Please check one.

____Less than Y500	____Y2,000-3,000	___Y5,000-6,000	____Y8,000-9,000
____Y500 - Y1,000	____Y3,000-4,000	___Y6,000-7,000	____Y9,000-10,000
____Y1,000 – Y2,000	____Y4,000-5,000	___Y7,000-8,000	____Over 10,000

31. Your working status? Please check one.
____Government _____Domestic Company _____Joint Venture _____Foreign Company
_____Educational Institution _____Unemployed _____Retired ____Self-employed_____Other

32. Your age category?
__Under 24 ___25 - 34 years ___35 - 44 years ___45 - 54 years ___55 - 64 years ___65 and over

33. What is the highest level of education that you have completed? Please check one.
___Elementary ___High School ___Technical School ___ College ___ University

Appendix 2. Estimation Results of Conditional Logit Model with Full Choice Set

	Model 3		Model 4	
Variables	Coefficient	Standard Error	Coefficient	Standard Error
PRICE	-0.2931**	(0.1362)	-0.3168**	(0.1635)
QUALITY	0.2662*	(0.1479)	0.4336***	(0.1765)
LOCATION	0.2480**	(0.1160)	0.1184	(0.1352)
SERVICE	0.2727**	(0.1417)	0.2410	(0.1599)
SELECTION	-0.2065*	(0.1257)	-0.2922**	(0.1420)
SUPERMARKET	-1.8735***	(0.2226)	-3.6552***	(1.3356)
INCOME2			0.1842**	(0.0830)
SHANGHAI2			1.1001**	(0.4538)
HOMERAISE2			-0.7189*	(0.3760)
GENDER2			0.1199	(0.3649)
FREQSHOP2			0.6754**	(0.3464)
MICROWAVE2			-0.1779	(0.5098)
HSIZE2			-0.1282	(0.1737)
AGE2			-0.1461	(0.1618)
WHOLESALER	-1.8500***	(0.2237)	-6.1919***	(1.9910)
INCOME3			-0.0081	(0.1063)
SHANGHAI3			1.1029*	(0.5951)
HOMERAISE3			1.1930*	(0.6663)
GENDER3			0.9784**	(0.4486)
FREQSHOP3			-1.0257*	(0.5359)
MICROWAVE3			2.3412**	(1.0850)
HSIZE3			0.7911***	(0.1857)
AGE3			-0.4429**	(0.1837)
Unrestricted Log Likelihood function	-220.670		-185.879	
Restricted (slopes=0) log likelihood function	-230.494		-230.4940	
Chi-Squared (χ^2)	19.648		89.230	
McFadden's pseudo R^2 Statistic	0.032		0.164	

***significant at p<0.01, ** significant at p<0.05, * significant at p<0.1